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ABSTRACT

This report, the seventh in a series, summarizes information taken from a variety of ongoing and special studies about education in Utah. The first type of information deals with students' academic achievements and aptitudes. This category includes results from the American College Testing Program, the Scholastic Aptitude Test, the Preliminary Scholastic Aptitude Test, the Utah Statewide Educational Assessment Program, the Advanced Placement Program, the National Assessment of Educational Progress Program, and several studies of international education. A second category of information relates to students' attitudes, noncognitive characteristics, and evaluations of their school experiences. Also included are two types of information on educational attainment that are reported in the national context compared with census figures and in connection with course-selection patterns of high school seniors. Utah students are showing improvement in a number of academic areas, and such improvement presumably reflects the impact of the educational reforms implemented to date. Reforms include higher requirements for graduation and college admission. Implications for additional educational reform are discussed. Test results and student information are presented in 37 exhibits. (Contains 26 references.) (SLD)

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UTAH EDUCATIONAL QUALITY INDICATORS

The Seventh in the Report Series

UTAH STATE OFFICE OF EDUCATION

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June 1989

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FOREWORD

Since 1967 the Utah State Office of Education has collected and reported pertinent information in respect to student performance statewide. This effort has taken the form of seven reports in the Utah Educational Quality Indicators series and five major Statewide Educational Assessments. It is the conviction of the Board and the State Office of Education that measurement of student achievement and other qualities is crucial as a basis for making progressive changes in the educational system.

This report, which is the seventh in the Quality Indicators series, summarizes the results from a variety of ongoing and special studies. These studies, taken together, provide a useful index of the performance of the Utah elementary and secondary public education system. A particular effort was made to document trends in student performance.

This report series, in conjunction with Utah's ongoing Statewide Educational Assessment program, represents a significant Utah attempt to document both the achievement of Utah students in basic skills areas and other important student learnings and characteristics.

Utah Educational Quality Indicators was prepared under the general direction of Dr. Kolene F. Granger, Associate Superintendent, Division of Research and Development. The authors of the report were Dr. David E. Nelson and John D. Ross.

James R. Moss
State Superintendent of Public Instruction

ACKNOWLEDGEMENTS

The successful completion of a report of the magnitude of Utah Educational Quality Indicators would not be possible without the excellent assistance and cooperation of many individuals and organizations. Outside the Utah State Office of Education, several organizations and individuals were extremely helpful in providing information which aided in the preparation of this report. Mark Ruger of the American College Testing program provided his usual excellent assistance in making available ACT information. Debra Von Bargan of the College Board provided fine service in supplying Scholastic Aptitude Test, Preliminary Scholastic Aptitude Test, and Advanced Placement program results. Kent Ashworth of the National Assessment of Educational Progress has been extremely helpful in providing NAEP resource materials.

Within the State Office of Education many staff members were instrumental in helping produce this report. Lee Gray did a superior job in preparing the cover and exhibits. Sharon Murdoch and her staff provided a fine quality printing job for the report.

In the Division of Research and Development, several staff members deserve a special thanks. Dr. Kolene Granger provided helpful suggestions on the content of the report. Barbara Banks and Nola Miller assisted in many aspects of the report. Finally, Laraine Broschinsky worked her typical miracles in producing a truly excellent typed manuscript.

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I. INTRODUCTION

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INTRODUCTION

For over twenty years, the State Office of Education has been systematically monitoring the academic performance and other characteristics of Utah students. This program began with the first report in this series which was published in 1967. The present report is the seventh in that series and, as with previous editions, the purpose of this report is to examine a variety of indicators which describe the quality of education in Utah's public schools. The focus in Quality Indicators is on the outcomes of education -- the knowledge, attitudes, and skills which students acquire. Quality Indicators reports the results of various testing programs and sources of information to provide a broad picture of student academic performance and other school-relevant characteristics.

In 1975, under the leadership of the State Board of Education and with a statement of legislative intent, Utah initiated a comprehensive program of statewide educational assessment. This program, which uses scientifically drawn, representative samples of schools and students, gauges the performance of nearly 8,000 Utah fifth and eleventh graders in approximately 100 schools every three years. Statewide assessment encompasses a wide variety of both academic and non-academic measures of student performance. A summary of state assessment findings is included in the present edition of Quality Indicators.

These two compatible, but methodologically different, approaches to examining the performance of Utah students together yield an important perspective on the performance of Utah elementary and secondary schools. This perspective includes the traditional academic areas and other important areas of educational focus such as student academic self-concept, attitude

toward school, the arts, and other areas which are not measured by traditional, basic skills-focused assessment programs.

The emphasis in the Quality Indicators series is on the examination of trends in the way Utah students score on the many measures reported in this volume. Certainly no one source of information reported here is by itself an adequate index of the total performance of Utah's public educational system. Taken together, however, the results reported provide a rather comprehensive picture of how the performance of Utah students today compares with that of the past, as well as how present levels of performance in the state compare with those nationally.

Quality Indicators in the Context of Educational Reform

In the Spring of 1983, educators, policy makers, and the public read with great concern the findings of a report commissioned by the U.S. Department of Education entitled, "A Nation at Risk." The report stimulated a wave of activity in the national educational community. The almost uniformly negative observations on the status of American education, along with an ambitious agenda for remediating observed problems, spawned a flurry of activity ranging from the production of similar reports by scores of groups and individuals to concrete policy and program initiatives in virtually every state and school district in the land.

Utah's response to what has come to be known as the educational reform movement was both strong and systematic. Initially, the State Office of Education examined the national findings contained in "A Nation at Risk" against the status of education in Utah (Nelson, 1983). This analysis showed that the national generalizations in "A Nation at Risk" were accurate for the state of Utah in some instances, but not others. This and other similar

analyses set the stage for the work of two high level commissions to study the status of public education in the state and make pertinent recommendations. The Utah State Board of Education established the Utah Commission on Educational Excellence, which issued a wide-ranging report calling for educational reform initiatives in the three basic areas of retaining and rewarding superior teachers, restructuring of the school curriculum, and using time more effectively in the schools. (Report of the Utah Commission on Educational Excellence, 1983)

Yet another major Utah effort was the work of the Governor's Education Reform Steering Committee. In their 1983 report, Education in Utah: A Call To Action, the Governor's Utah Education Reform Committee addressed many of the same issues which were identified in the work of the State Board of Education's Commission. The Reform Steering Committee report also featured a rather thorough analysis and related recommendations in the area of adequate financing of education.

Approximately six years after the issuance of many national reports and the two major Utah efforts described above, policy makers and educators in the state of Utah have set in place numerous major reform efforts. This includes significant actions by the State Board of Education, the Legislature, local school districts, schools, and individual teachers. Included in these reform initiatives at the state level is what is probably the nation's most comprehensive system of career ladders for enhancement of the teaching profession. Utah has also implemented a new set of graduation requirements and elementary and secondary programs of studies featuring an objectives-based, kindergarten through twelfth grade core curriculum accompanied by a strong, criterion-referenced assessment program. Also in place are more rigorous standards for graduation. Reform has stressed additional focus on

student educational planning, new guidelines for student activities, a master plan for vocational education, and a statewide effort in improving the role and performance of the school principal. Utah is aggressively implementing year-round schools where appropriate. The state also has major programs in such areas as technology, distance learning, educational productivity, enhanced teaching scholarships, Advanced Placement, and concurrent college enrollment.

All of these statewide programs, as well as similar efforts at the local level, have the potential for enhancing the quality of education for Utah students. Thus, it would seem increasingly important to continue to monitor the performance of Utah students on a variety of academic and non-academic measures. Utah Educational Quality Indicators, along with Utah's Statewide Educational Assessment program, provide the state with a long-term view of the performance of students statewide. Over a period of time these programs will provide significant information concerning the impact of the many educational reform efforts.

A Shift in Focus

In 1987, the Utah State Board of Education appointed a Strategic Planning Commission which was charged with the creation of a broad statement of educational philosophy which would set forth in major concepts a new direction for public education in the state of Utah. This important work defines the mission of public education and identifies major goals for the system as well as student outcomes which should be realized if such goals are implemented.

The mission statement focuses on the individual student and directs the entire system to share in that orientation:

> The mission of public education is to empower each student to function effectively in society as a competent, productive, caring and responsible citizen. [pg.4]

The Shift in Focus document outlines several specific goals which are a logical extension of the mission statement:

I. Involve students as full partners in their pursuit of learning, accountable for their actions.

II. Enlarge parental and community involvement to enhance school and student success.

III. Establish a curriculum and instructional delivery system that has measurable outcomes.

IV. Ensure that every school is an effective learning center with a positive learning climate.

V. Increase the sensitivity, effectiveness, efficiency, and satisfaction of teachers, administrators, and other educational professionals.

VI. Increase learning and productivity through technology.

The implementation of this set of six major system goals would be instrumental in reaching several critical sets of student outcomes. These outcomes include the following:

- Students empowered by educational partnerships with parents, teachers, and communities to foster the development of each student's individual social and academic potential.
- Students with a love of learning.
- Students prepared for the next stages in their personal, educational, and occupational development, with a foundation for lifelong learning.
- Students with an understanding and appreciation of the intellectual, cultural, artistic, and political heritage from which our American society springs.
- Students capable of the wise and responsible exercise of personal, political, and economic freedom.
- Students prepared to address the challenges of the 21st century, including an increasingly technological and information/oriented society, and competition with international peers.

Clearly this new initiative on the part of the State Board of Education carries strong implications for how assessment should be conducted and the specific areas which must be assessed. The student outcomes which are

delineated in the Shift in Focus document are in one sense a continuation of a long-term emphasis in the state on defining education to encompass not only the cognitive skills which are typically highlighted in educational goals, but also the other important aspects of human development which are often non-cognitive. Both the Utah Educational Quality Indicators report series as well as the Utah Statewide Educational Assessment Program have been characterized by a strong emphasis on the measurement of basic skills as well as the measurement of other key dimensions of student characteristics including the social, emotional, aesthetic, and career competency domains.

The National Test Score Decline and Beyond

A major area of concern expressed in "A Nation at Risk" and similar analyses of the status of public education dealt with a decline in various kinds of test scores during the decades of the 1960's and 1970's. The most visible and highly reported decline was in the area of college entrance examination scores, including the two major programs in this area, the Scholastic Aptitude Test (SAT) and the American College Testing program (ACT). In 1975, the College Entrance Examination Board (CEEB) commissioned an intensive study of the score decline. In their report, CEEB's advisory panel, chaired by Willard Wirtz, former Secretary of Labor, concluded that the score decline was unquestionably more than a statistical artifact, and was of real educational significance. This observation was strengthened by the panel's conclusion that declines have occurred on a variety of standardized academic tests in addition to the SAT.

More recently, after a period of essentially level scores for college entrance test performance, 1982 marked the first increase in national average scores as measured by the Scholastic Aptitude Test. This was, in fact, the

first time since 1963 any increase in SAT scores had been noted. This 1989 edition of Quality Indicators, in the sections to follow dealing with ACT and SAT score results, illustrates the trends of student performance over the past several years for both the nation and the state. Both the national and state results suggest an end to the two decades of score declines on college entrance measures and, indeed, substantial growth in the present decade.

Sources of Information for this Report

Utah Educational Quality Indicators contains information of several basic types. The first type of information deals with student academic achievement and aptitude. Included in this category are results from the American College Testing program, the Scholastic Aptitude Test, the preliminary Scholastic Aptitude Test, the Utah Statewide Educational Assessment program, the Advanced Placement program, the National Assessment of Educational Progress, and several studies of international education.

A second category of information relates to student attitudes, noncognitive characteristics (such as academic self-concept) and evaluations of their school experiences. These results are found in the chapter reporting results from the ACT as well as the chapter on the Statewide Assessment Program.

Also included in this volume are two kinds of information on educational attainment. These are reported in the chapter dealing with the United States Census and the chapter dealing with the course-taking patterns of Utah high school seniors. Each of these sources of information will be described in detail in their respective chapters.

Limitations of the Report

The information contained in Quality Indicators is a compilation of existing test results and other findings taken from several different sources. Each of the testing or other data gathering programs which provided results for Quality Indicators had its own purposes for measuring student performance and other characteristics. With the exception of the Utah Statewide Educational Assessment program, the purposes of these other measurement efforts were not centered on assessing the quality of public education in the state of Utah. Taken in total, however, results from these various measurement programs are certainly important indicators of the overall performance of Utah's public school system.

It should be emphasized that this report, which is based on a variety of results from ongoing and special studies, cannot take the place of a scientifically-based program of student assessment. Utah has such a program in its Statewide Educational Assessment which is conducted every three years. Statewide Assessment provides definitive cognitive and non-cognitive information about the functioning of Utah's school system based on large, representative samples of fifth and eleventh grade students. Summaries of Statewide Assessment Results are included in this volume and are an important portion of the Quality Indicators approach which gathers information from numerous sources to help describe the status and trends of the educational performance of Utah students.

II. AMERICAN COLLEGE TESTING PROGRAM (ACT) INFORMATION

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AMERICAN COLLEGE TESTING PROGRAM (ACT)

The American College Testing Program provides a regularly scheduled program of testing and reporting to students, school systems, and colleges across the nation. Students taking the ACT Battery are generally college-bound eleventh or twelfth graders.

ACT scores have typically been required for admission by institutions of higher learning in Utah. As of 1988, over 65% of the students in a given graduating class in the state of Utah took the ACT. Among the major uses of ACT test information are status reports on student educational development, uniform information on educational attainment, information for student placement, baseline data on students for institutional research, and the prediction of student academic performance in college.

Each year almost one million students across the United States take the ACT and these results are used by over 20,000 educational institutions. The ACT is the major college admissions test used in 28 of the 50 states.

While the ACT battery has changed somewhat since its inception in 1959, the core of the testing program has remained essentially the same. At present, the battery consists of the following sub-tests or sections as described by ACT (1987):

> English Usage (75 items, 40 minutes). This test measures the student's understanding of the conventions of standard, written English: punctuation, grammar, sentence structure, diction, and style, and logic and organization. The test does not measure the rote recall of grammatical rules; instead, it stresses the ability to analyze effective expository writing of the kind that will be encountered in college courses.
>
> The Mathematics Usage Test (40 items, 50 minutes). This test measures the student's mathematical reasoning ability. It emphasizes the solution of practical, quantitative problems that are encountered in many college courses and includes mathematical techniques typically covered in high school courses. The test emphasizes quantitative reasoning, rather than memory of formulas, knowledge of techniques, or computational skill.

The Social Studies Reading Test (52 items, 35 minutes). This test measures the student's ability to read, analyze, and evaluate social studies materials. There are two types of items: the first type is based on reading passages, and the second on general background or knowledge obtained in high school social studies courses. The items based on reading passages require reading comprehension skills and the ability to draw inferences and conclusions to examine the interrelationships and import of ideas, to extend ideas to new situations, to make deductions from experimental or graphic data, and to recognize a writer's bias, style, and mode of reasoning. The background knowledge items ask the students to apply what they have learned in high school social studies courses to familiar, new, or analogous problems.

The Natural Sciences Reading Test (52 items, 35 minutes). This test measures the student's ability to read, analyze, and evaluate material from the natural sciences. There are two types of items: the first type is based on reading passages, and the second on knowledge typically gained in high school science courses. The reading passages concern a variety of scientific topics and problems, often describing scientific experiments and summarizing their procedures and outcomes. The questions based on these passages require reading comprehension skills, and the ability to understand and distinguish between the purposes of experiments, to examine the logical relationship between experimental hypotheses, and the generalizations that can be drawn from the experiments, to predict the effect of the application of ideas to new situations, to judge the practical value of elements in an experiment, and to evaluate proposed alternative ways of conducting an experiment. The knowledge items ask the students to apply what they have learned in high school science courses to familiar, new, or analogous problems.

The Student Profile Section and Interest Inventory. The student profile section requests information about each student's admissions and enrollment plans, academic and out-of-class high school achievements and aspirations, and high school course work. The ACT interest inventory is designed to measure six major interest dimensions. Results are used to compare the students interests with those of college-bound students who later majored in each of a wide variety of areas. [pg. 1]

A Note on the Interpretation of ACT Achievement Test Scores

The publication, "Using the ACT Assessment on Campus" (1984) contains the following description of the ACT standard score scale system:

> For each of the four academic tests, the raw score is the number of correct responses. These raw scores are converted to standard scores on a scale that ranges from one (low) to thirty-six (high). This conversion puts the results of the four tests on a common

> scale and allows the standard score on any one test to be compared with the standard scores on other tests. The composite score is the average of the standard scores on the four tests. The mean composite score for college-bound high school students is approximately 18. [pg. 2]

Long-Range Trends in State and National ACT Performance

An examination of the nineteen-year period from 1970 through 1988 documents a general down-trend in the performance of both Utah and national students on the ACT from the early 1970's which persisted until nearly the end of that decade. This down-trend impacted every score area of the ACT to some degree.

The following sections will present a detailed analysis of score trends on all five ACT tests for the most recent eight-year period beginning in 1981 and ending in 1988. It should be noted that, beginning in 1985, the ACT national results are based on all of the students in a given graduating class taking the test on the five national test dates. This is a departure from ACT's previous procedure of reporting results for a 10% random sample of students taking the test.

Utah and National ACT Results for the Most Recent Eight-Year Period: 1981-1988

Exhibits 1 through 5 present the most recent ACT standard score averages (means) for Utah high school students taking the test from 1981 through 1988. Averages are also presented for the national group of ACT test-takers for the same period of time. As was noted earlier, beginning with 1985, both Utah and national results are for only the students in a specific graduating class and national results are now based on all students taking the test rather than the previous 10% random sample.

The comparison between Utah and national averages places the state at somewhat of a disadvantage since a higher percentage of Utah students take the ACT than is true in most other states. The ACT is taken by a self-selected group of students and Utah has traditionally had a very high percentage of a given graduating class elect to take this test. In the 1987-88 school year, over 65% of the students in the graduating class of 1988 elected to take the ACT in Utah. Thus, the national average on the ACT is, in a sense, a moderately difficult standard for the state of Utah on this test. A related implication here is that the Utah group of students taking the ACT likely includes many lower-scoring students who would not elect to take this test in many other states.

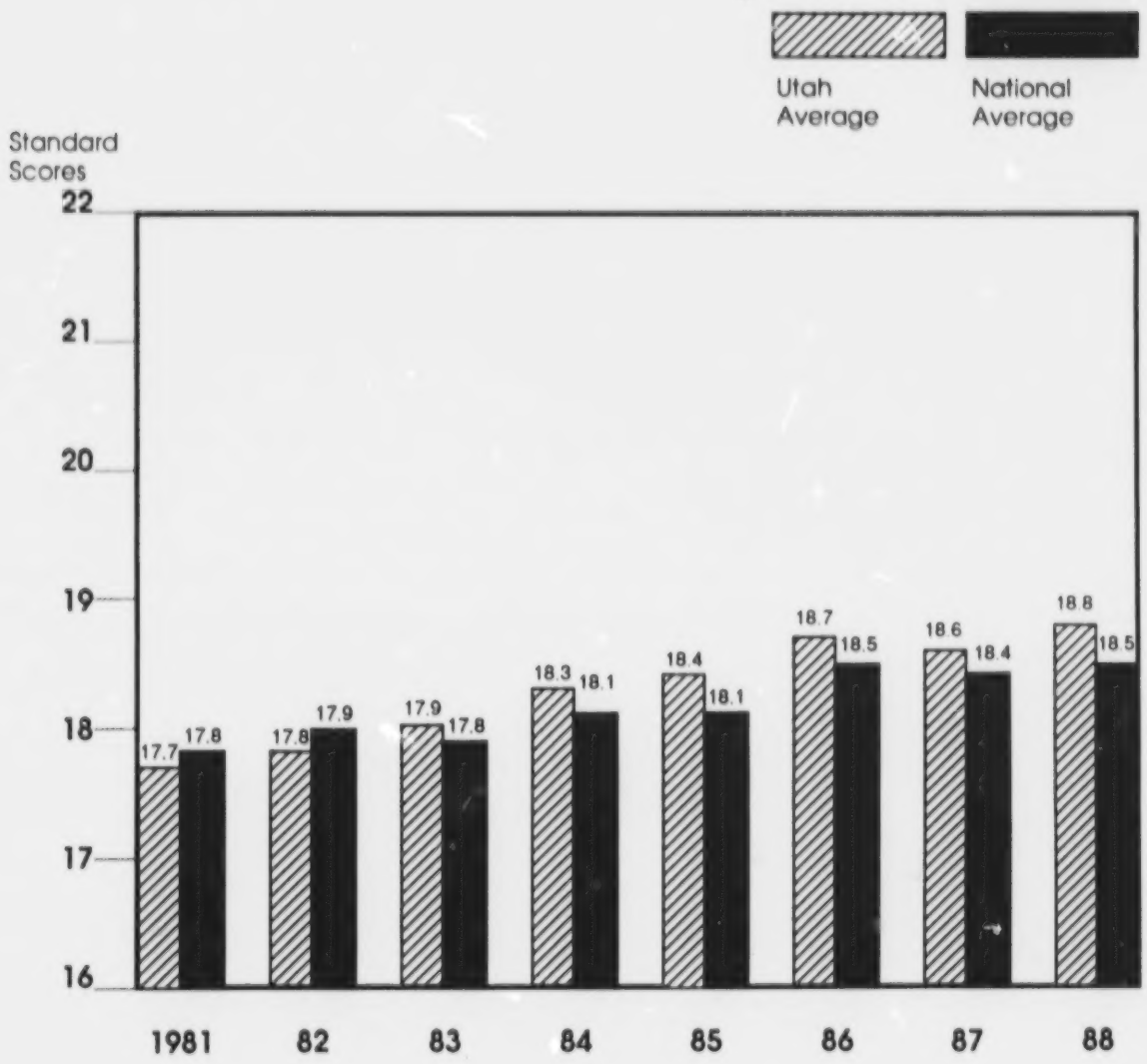
In the period of time represented in Exhibits 1 through 5, the number of Utah students taking the ACT has ranged from a low of 12,570 in 1986, to a high of 15,012 in 1988. The number of students taking the test nationally in 1988 was 842,322.

English - Exhibit 1. Exhibit 1 presents the results for both the Utah students and the national group of students taking the ACT English test from 1981 through 1988. Both Utah and national scores have risen gradually over this period of time. Between 1981 and 1988 Utah scores are up over one full standard scale point. The 1988 Utah average of 18.8 is the highest average score obtained by Utah students on the ACT English test over the twenty-two year period for which ACT results are available.

Mathematics - Exhibit 2. Results for Utah students and the national group taking the ACT mathematics test are depicted in Exhibit 2. Over this most recent eight-year period Utah students have consistently under-performed the national group of ACT test-takers on the mathematics test. The state's lowest average score on the mathematics test was realized in 1983 when an

EXHIBIT 1

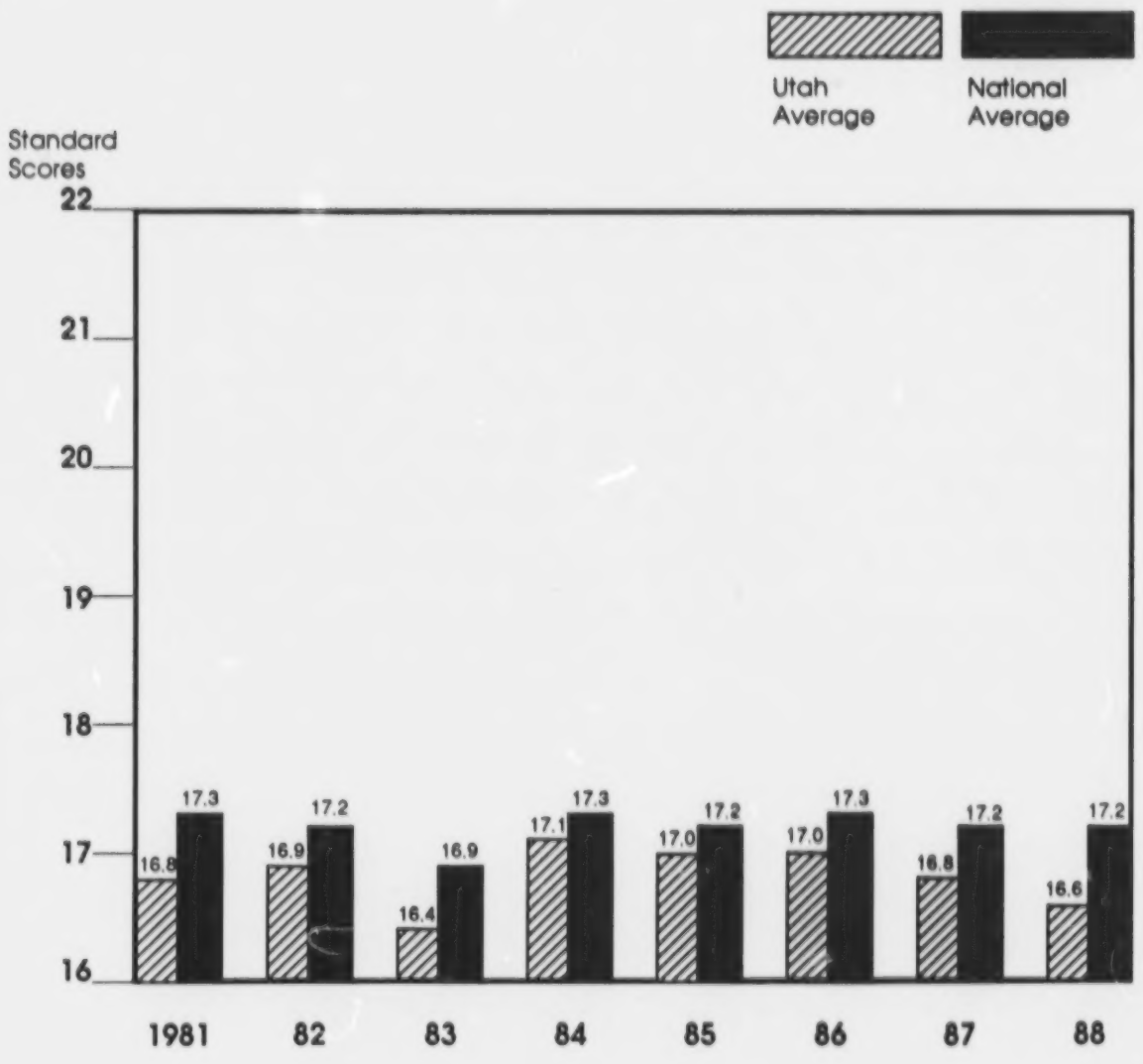
Utah versus National ACT **English** Average Scores for College-bound High School Students



Source: ACT High School Profile Reports 1981-88

EXHIBIT 2

Utah versus National ACT **Mathematics** Average Scores for College-bound High School Students



Source: ACT High School Profile Reports, 1981-88

average score of 16.4 was attained. While a rather sizeable gain was noted in ACT mathematics performance in 1984, performance on this test has again subsided and remains substantially lower in 1988 than the levels of performance observed during the early 1970's.

Social Studies - Exhibit 3. The pattern of performance of Utah students on the ACT social studies test is similar to that observed for several other tests in the battery. During the period of time from 1981 through 1988 the scores of Utah students were consistently above the national average with a substantial increase in performance being noted in 1984. In spite of the recent positive trend of performance, both Utah and national social studies averages remained lower than the levels of performance on this test twenty years earlier.

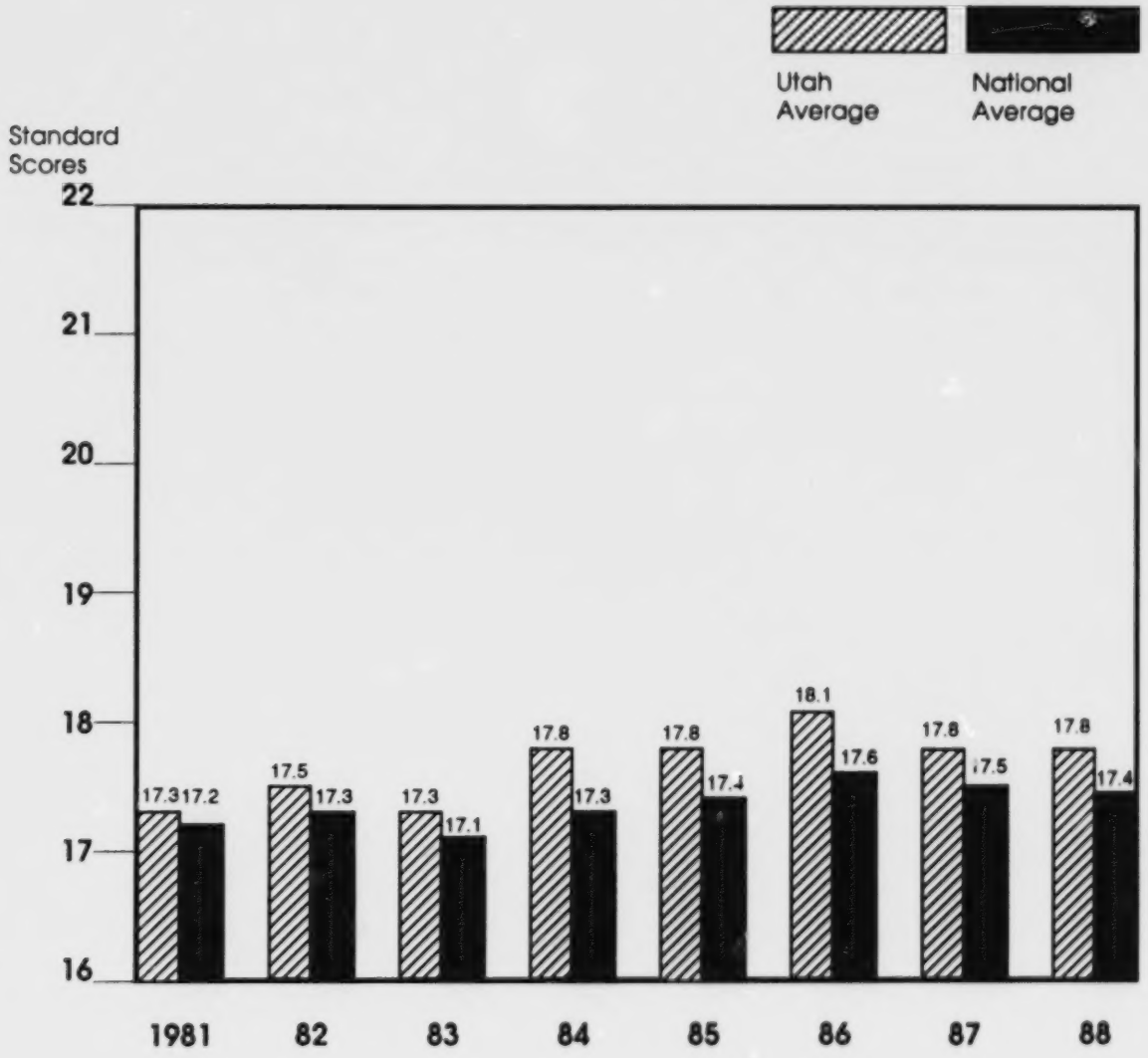
Natural Science - Exhibit 4. Utah students have traditionally shown performance superior to that of the national ACT group on the natural science test. The scores of Utah students exceed those of the national group in every year from 1981 through 1988. Utah's 1988 average of 22.0 represents a twenty-two year high on the ACT Natural Science test.

Composite Achievement - Exhibit 5. Exhibit 5 shows the performance of the Utah and national groups on the ACT composite score which represents an average of the other four ACT achievement tests. Utah students were actually underperforming the national comparison group in 1981, but more recently have scored slightly higher than the national group of students. The Utah composite average showed a rather substantial increase in 1984 which has basically been maintained since that year.

Perhaps the most remarkable finding in an analysis of all of the tests comprising the ACT battery for the period from 1981 through 1988 is the substantial increase in the average performance of Utah students during the

EXHIBIT 3

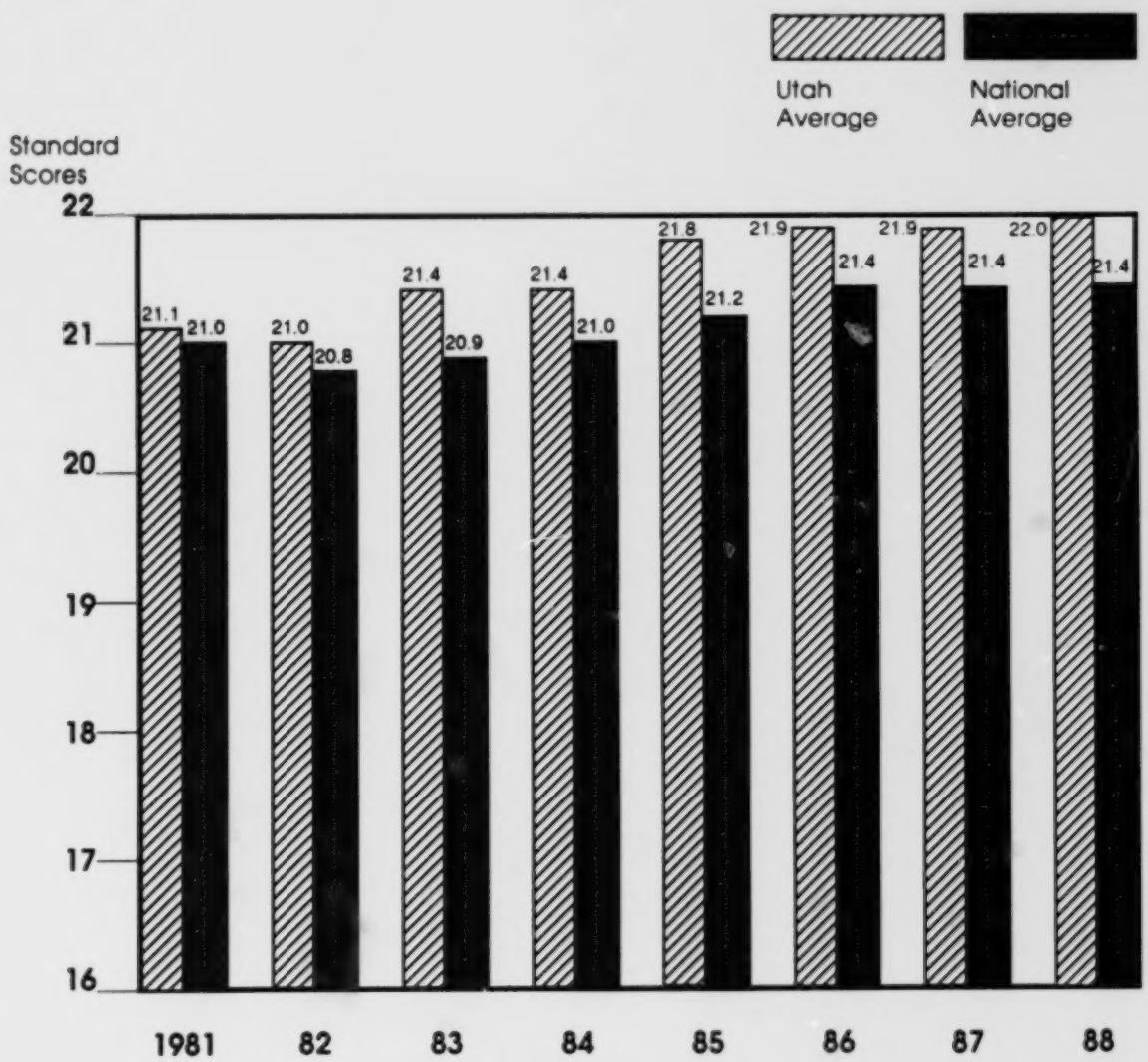
Utah versus National ACT **Social Studies** Average Scores for College-bound High School Students



Source: ACT High School Profile Reports 1981-88

EXHIBIT 4

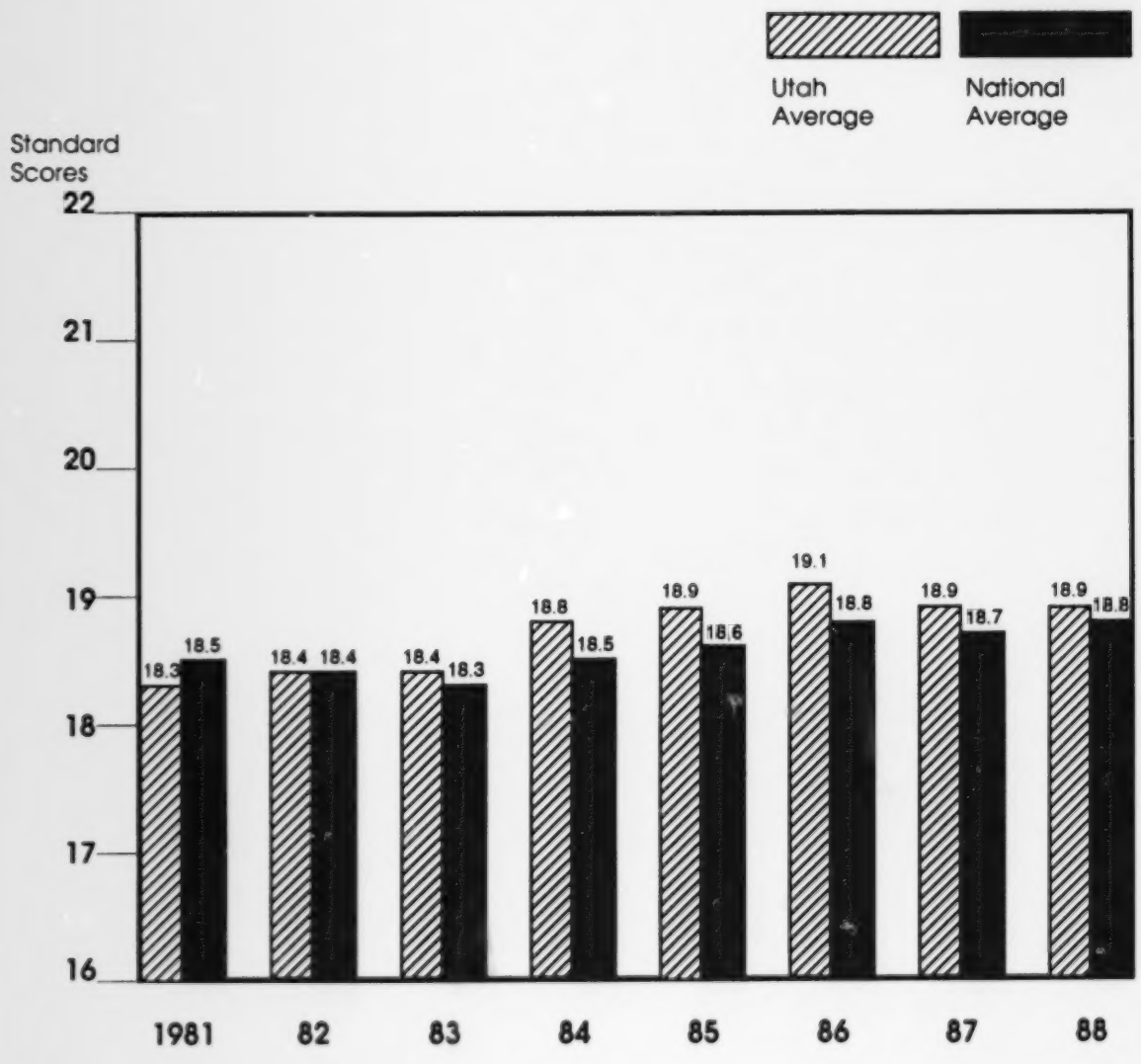
Utah versus National ACT **Natural Science** Average Scores for College-bound High School Students



Source: ACT High School Profile Reports 1981-88

EXHIBIT 5

Utah versus National ACT **Composite** Average Scores for College-bound High School Students



Source: ACT High School Profile Reports 1981-88

middle of the decade. To some extent, the Utah increases are mirrored by the national results, however, the absolute gains of Utah students over this period of time are substantially greater than those achieved by national test-takers. As of 1988, two areas measured by the ACT, English and natural science, show Utah averages at twenty-two year historical highs. The other two content areas measured by the ACT, mathematics and social studies, have evidenced some improvement through the middle of the decade but still remain considerably lower than the scores achieved by Utah students in the early 1970's.

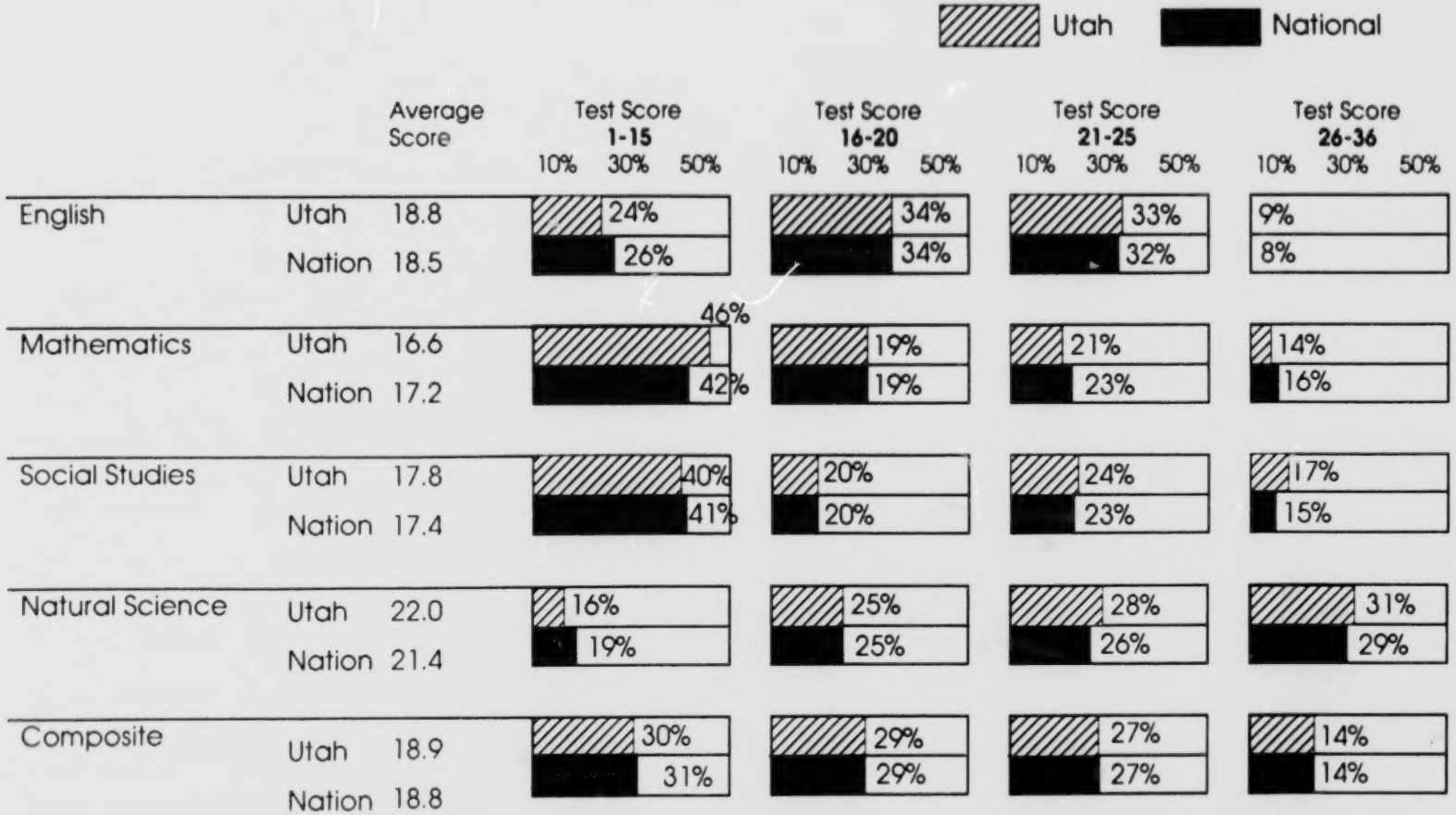
Percentage of Students Scoring in Various ACT Intervals - Exhibit 6. Exhibit 6 presents an analysis of the percentage of the Utah and national ACT test-takers scoring in the ACT's four major intervals in 1988. The percentage of Utah students scoring in the test's top two intervals is higher than the national percentage for every test except mathematics. As would be expected from an analysis of the Utah and national average scores, the percentage of Utah students scoring in the top intervals on ACT math is slightly lower than the national percentages. Looking at only the highest level of performance on the test, the interval from 26 to 36, Utah students outperformed their counterparts nationally on every test except mathematics.

Differences Between Selected Groups of Students on the ACT Achievement Test

Important differences between the average scores of various groups of students taking the ACT are apparent in both the Utah and national results. Some of the score differences with the most important implications are highlighted in the following sections.

EXHIBIT 6

Percentages of Utah Students Scoring in Various ACT **Test Score Intervals** Compared to National ACT Group, 1988



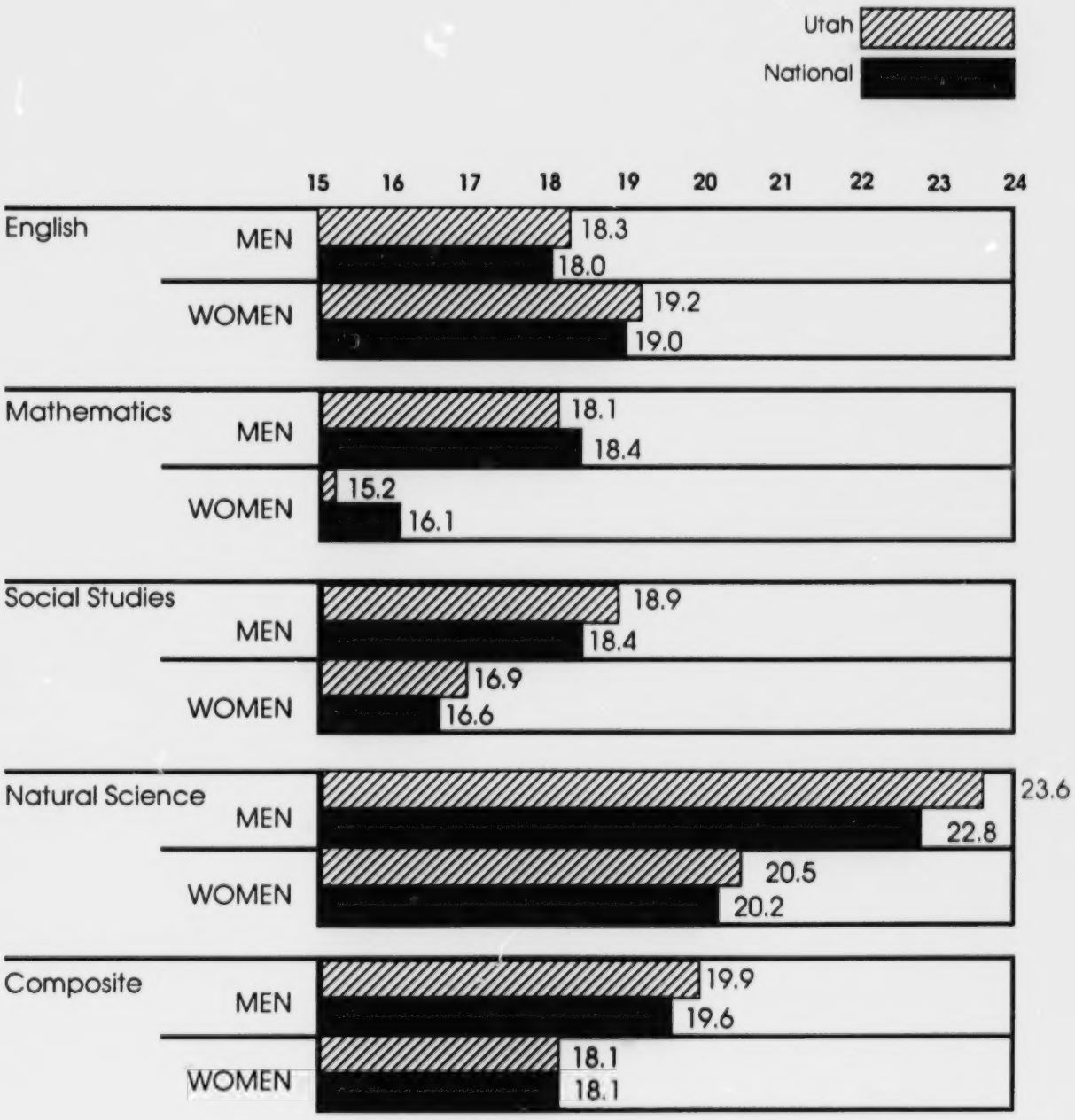
Source: ACT High School Profile Report, 1988

Sex Differences in the ACT Achievement Scores - Exhibit 7. Exhibit 7 contrasts the scores of male and female students taking the ACT in Utah and the nation for 1988. Findings illustrated here are indicative of a consistent pattern of differences between the scores of males and females taking the test which has been present for two decades in both national and state results. This pattern of differences finds female students scoring at higher average levels on the English test, while males demonstrate superior performance in mathematics, social studies, natural science, as well as the composite score. Score differences between males and females are most pronounced in the mathematics and natural science areas for both Utah and the nation. In 1988, Utah males scored higher than the national group of male test-takers in every area of the test except mathematics where performance was relatively close. Utah females scored higher than their counterparts on every area of the test except mathematics where Utah women underperformed the national sample by a substantial margin The magnitude of the differences in the performance of Utah males and females on the mathematics and natural science tests in particular, remains a clear area of concern.

Differences in ACT Achievement Scores Related to High School Course Selection - Exhibit 8. Exhibit 8 contrasts the ACT scores of Utah and national students taking a rigorous college preparatory curriculum versus the average scores of other high school graduates. For the purposes of this analysis, a rigorous college preparatory curriculum included at least four years of English, three years of math, three years of social studies, and three years of science during grades nine through twelve. The Utah students taking a rigorous curriculum included 4,151 students in the class of 1988 or about 28% of the state's total test takers. The national group taking this same curriculum was approximately 32% of the total national group.

EXHIBIT 7

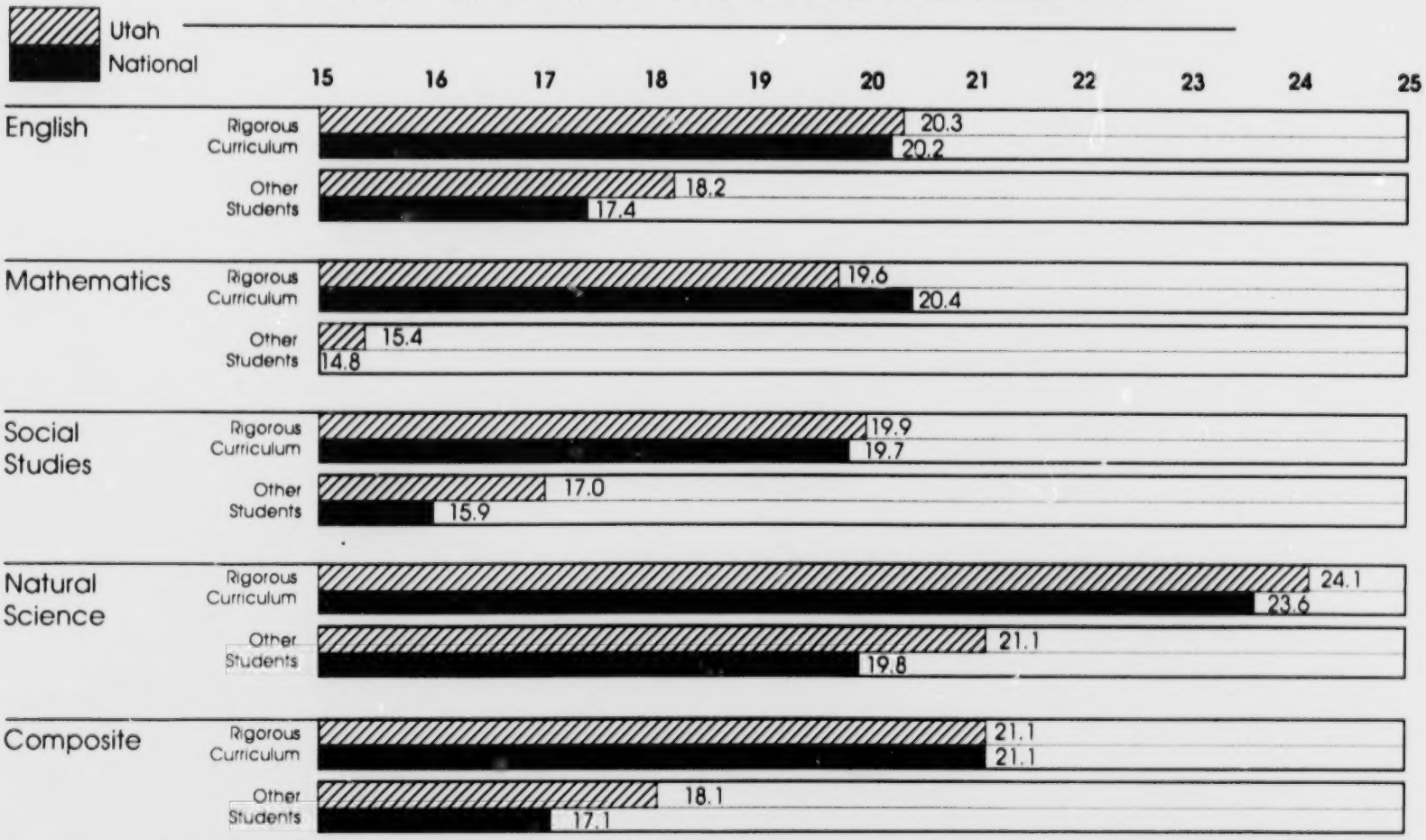
Average ACT Scores of Utah Male and Female Students Compared to the National ACT Group, 1988



Source: ACT High School Profile Report, 1988

EXHIBIT 8

Average ACT Scores for High School Graduates Who Took A Rigorous College Preparatory Curriculum* Versus Other Graduates



* A rigorous college preparatory curriculum included at least the following in grades 9-12: English: 4 years Math: 3 years Social Studies: 3 years Science: 3 years

Source: ACT High School Profile Report, 1988

The impact of a strong high school program on ACT scores is apparent in an inspection of Exhibit 8. Substantial differences favor those students taking the stronger college preparatory curriculum in every area of the ACT. The magnitude of these differences ranged from approximately 2 points on the English test to 4 full standard scale points for the mathematics test. The impact of course taking is particularly noticeable in mathematics and natural science.

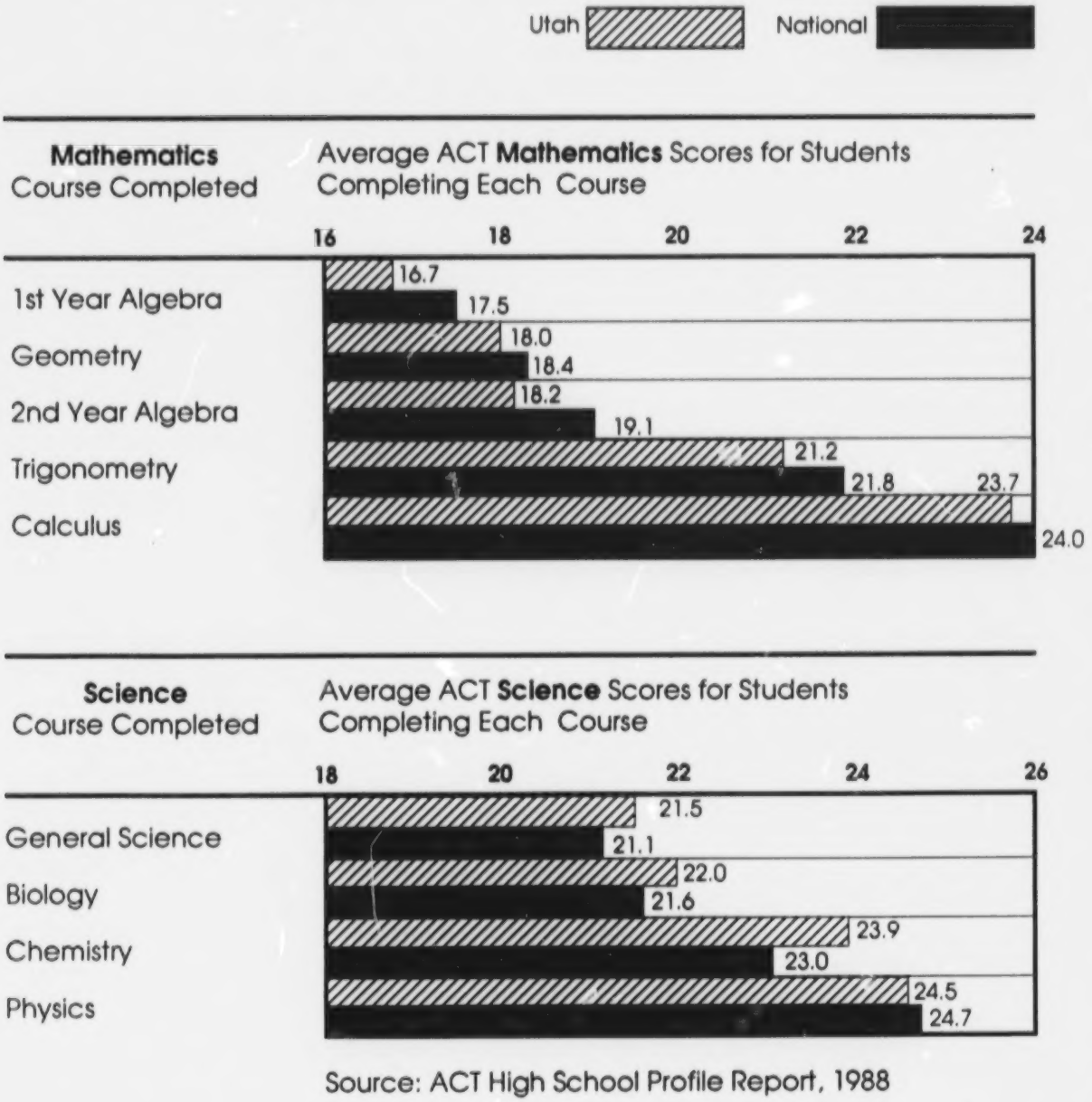
Utah students taking the more rigorous preparation outscored their national colleagues in every comparison with the exception of mathematics. Interestingly, an appraisal of those students taking less than a rigorous curriculum also showed Utah students scoring at a higher level on the average than their national peers on every ACT sub-test.

Influence of Specific Courses on ACT Mathematics and Science Performance - Exhibit 9. Exhibit 9 profiles the performance of Utah and national students who have taken specific courses in mathematics and science. An analysis of the mathematics section shows that students taking intermediate and higher level mathematics courses such as second-year algebra, trigonometry and calculus perform at much higher levels than students who have had only first year algebra and geometry.

The influence of science courses is also profound. Those students who have taken chemistry and physics score far higher on the ACT natural science score than students who have had only general science or biology. Both of these illustrations serve to point up the enormous sensitivity of the ACT to different patterns of course taking on the part of students.

EXHIBIT 9

Average ACT Scores for Utah and National Students Who Have Completed Specific Mathematics and Science Courses, 1988



Source: ACT High School Profile Report, 1988

Results From the ACT Student Profile Section

In addition to the results from the ACT achievement tests which have been presented above, the American College Testing program furnishes a variety of other information about the high school students who are tested each year. This information, contained in the ACT student profile section, provides a variety of biographical data, information about educational and vocational plans, and student evaluations of their high school educational experiences.

Student Ratings of the Adequacy of Their Total High School Education - Exhibit 10. A major element of the ACT student profile section allows students to rate the overall adequacy of their high school experience. Initially, students classify their personal high school program as emphasizing one of four major areas. These include: business-communication, vocational-occupational, college preparation, or general. The results shown in Exhibit 10 find Utah students rating their high school programs considerably higher than do their national colleagues. For example, 59% of the Utah vocational-occupational students rated their program as either "good" or "excellent" compared to 52% of the national comparison group. For those students classifying themselves as taking a college preparatory curriculum, 73% of the Utah group characterized their high school program as "good" or "excellent" while 69% of the national group of students held the same opinion. Much the same trend of results was true of students classifying themselves as taking a business-communication course of study and those students who characterized their program as "general."

Students' Satisfaction With Specific Aspects of The Local High School - Exhibit 11. Exhibit 11 presents an analysis of the satisfaction of Utah and national students with specific aspects of their local high school programs.

EXHIBIT 10

Expressed Adequacy of Utah High School Education Compared to National Results According to Curriculum or Program, 1988

Expressed Adequacy	Business Communication		Vocational Occupation		College Preparation		General and Other	
	Utah	National	Utah	National	Utah	National	Utah	National
Excellent	14%	11%	14%	9%	26%	21%	13%	10%
Good	48%	45%	45%	43%	47%	48%	46%	42%
Average	24%	32%	27%	34%	14%	20%	29%	36%
Below Average	5%	5%	5%	6%	3%	3%	6%	7%
Very Inadequate	9%	8%	9%	7%	9%	8%	7%	6%
Number of Utah Students	1,384		1,725		7,102		3,991	
Number of National Students	67,913		48,666		531,793		140,460	

Source: ACT High School Profile Report, 1988

EXHIBIT 11

Utah versus National Student Satisfaction with Various Aspects of Local High Schools, 1988

AREA	Satisfied No Change Necessary		Pretty Much Neutral		Dissatisfied, Improvement Needed		No Experience	
	Utah	National	Utah	National	Utah	National	Utah	National
Classroom Instruction	56%	58%	28%	25%	11%	11%	0%	0%
Number and Variety of Course Offerings	57%	51%	20%	17%	10%	26%	0%	1%
Grading Practices and Policies	46%	51%	31%	26%	17%	17%	1%	1%
Number and Kinds of Tests Given	49%	51%	37%	33%	8%	10%	1%	1%
Guidance Services	49%	53%	27%	20%	18%	20%	2%	2%
School Rules, Regulations, and Policies	40%	35%	28%	25%	27%	34%	1%	1%
Library or Learning Center	50%	53%	27%	25%	17%	16%	2%	2%
Laboratory Facilities	40%	43%	31%	27%	18%	19%	7%	5%
Provisions for Special Help in Reading, Math, etc.	35%	35%	25%	21%	9%	13%	27%	26%
Provisions for Academically Outstanding Students	61%	50%	20%	20%	7%	13%	8%	11%
Program for Career Education and Planning	41%	39%	30%	26%	20%	23%	4%	7%

Source: ACT High School Profile Report, 1988

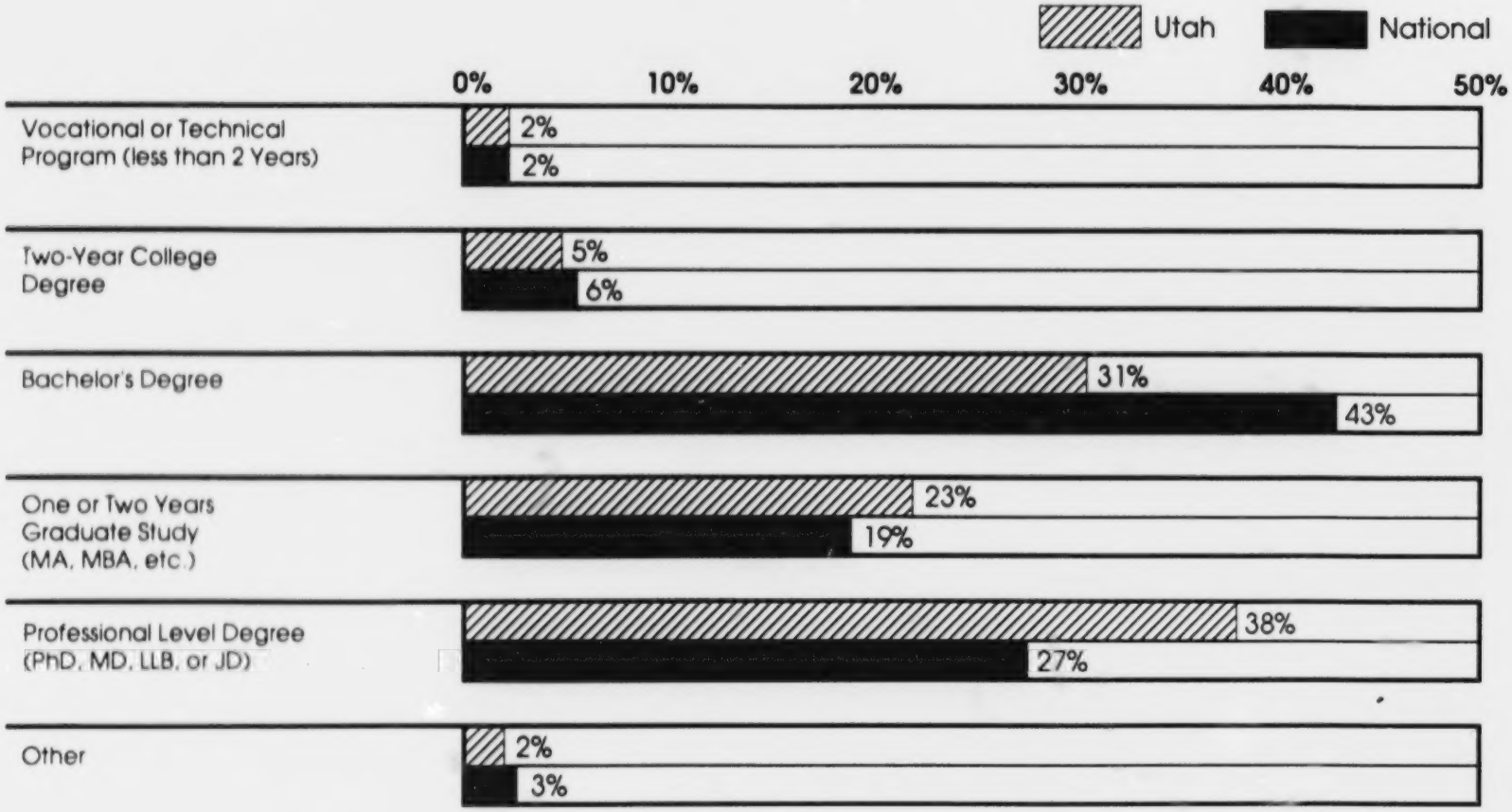
Areas receiving the highest marks from Utah students were provisions for academically outstanding students, number and variety of course offerings, and the quality of classroom instruction. Rated at lower levels by Utah students were such areas as provisions for special help in subjects such as reading and math, quality of laboratory facilities, and programs for career education and planning.

Educational Degree Aspirations - Exhibit 12. Exhibit 12 shows the degree aspirations of Utah high school students as they compare to the national ACT group for 1988. The pattern of results depicted in this exhibit is characteristic of a long-term trend in the aspirations of Utah students. Specifically, a substantially higher percentage of Utah students seek a professional level degree such as the Ph.D. or M.D. than is true nationally. There is also a higher number of Utah students interested in pursuing either one or two years of graduate study. This is coupled with a smaller percentage of Utah students indicating they are pursuing the Bachelor's degree. Utah and national figures are essentially similar in the areas of vocational/technical programs and the two-year college degree.

Proposed Educational Major - Exhibit 13. Students completing the ACT high school profile section had an opportunity to indicate their preference for a college major. Exhibit 13 presents those proposed educational majors for both the Utah students and the national group of ACT test-takers. By far the most popular proposed majors shown in Exhibit 13 are business and commerce (selected by 21% of the Utah students), health professions (selected by 12%) and the social sciences (selected by 10%). Other majors receiving relatively high rates of endorsement were education (8%), engineering (8%), and the fine and applied arts (7%). In most instances, the preferences expressed by Utah students are very similar to those indicated by the national ACT group.

EXHIBIT 12

Educational Degree Aspirations of Utah High School Students Compared to National ACT Group for 1988



Source: ACT High School Profile Report, 1988

EXHIBIT 13

Proposed Educational Major of Utah High School Students Compared to National Group, 1988

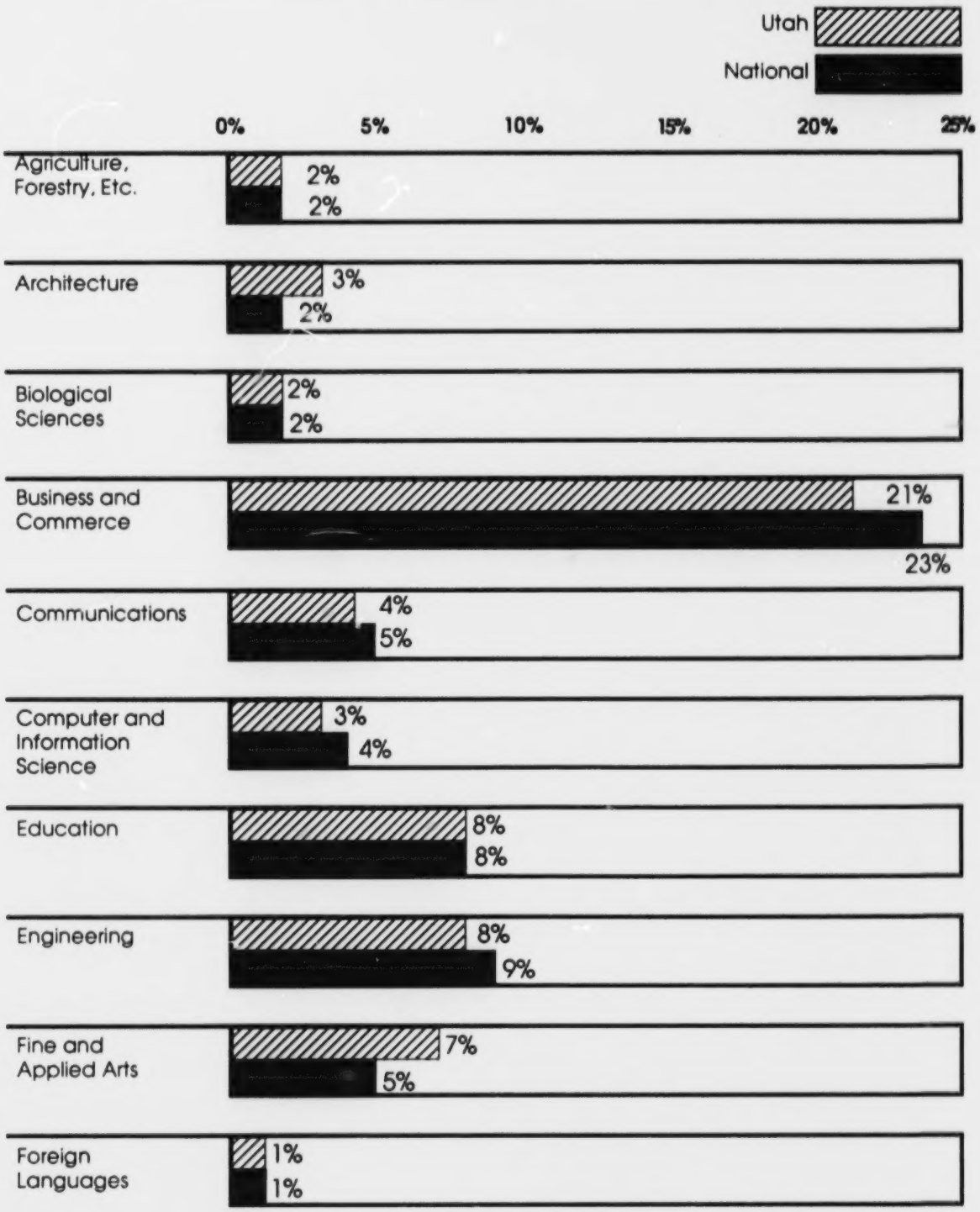


EXHIBIT 13
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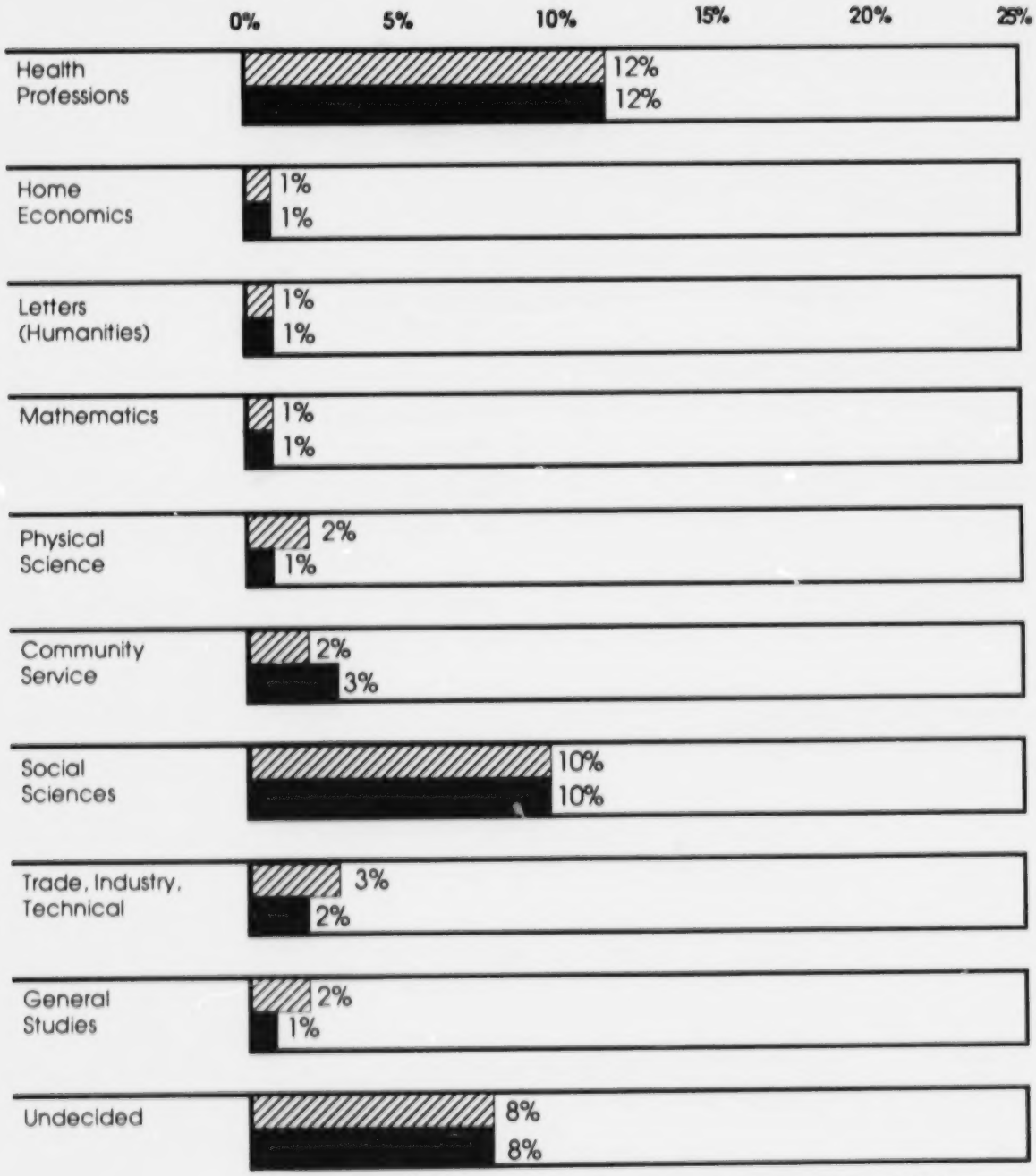
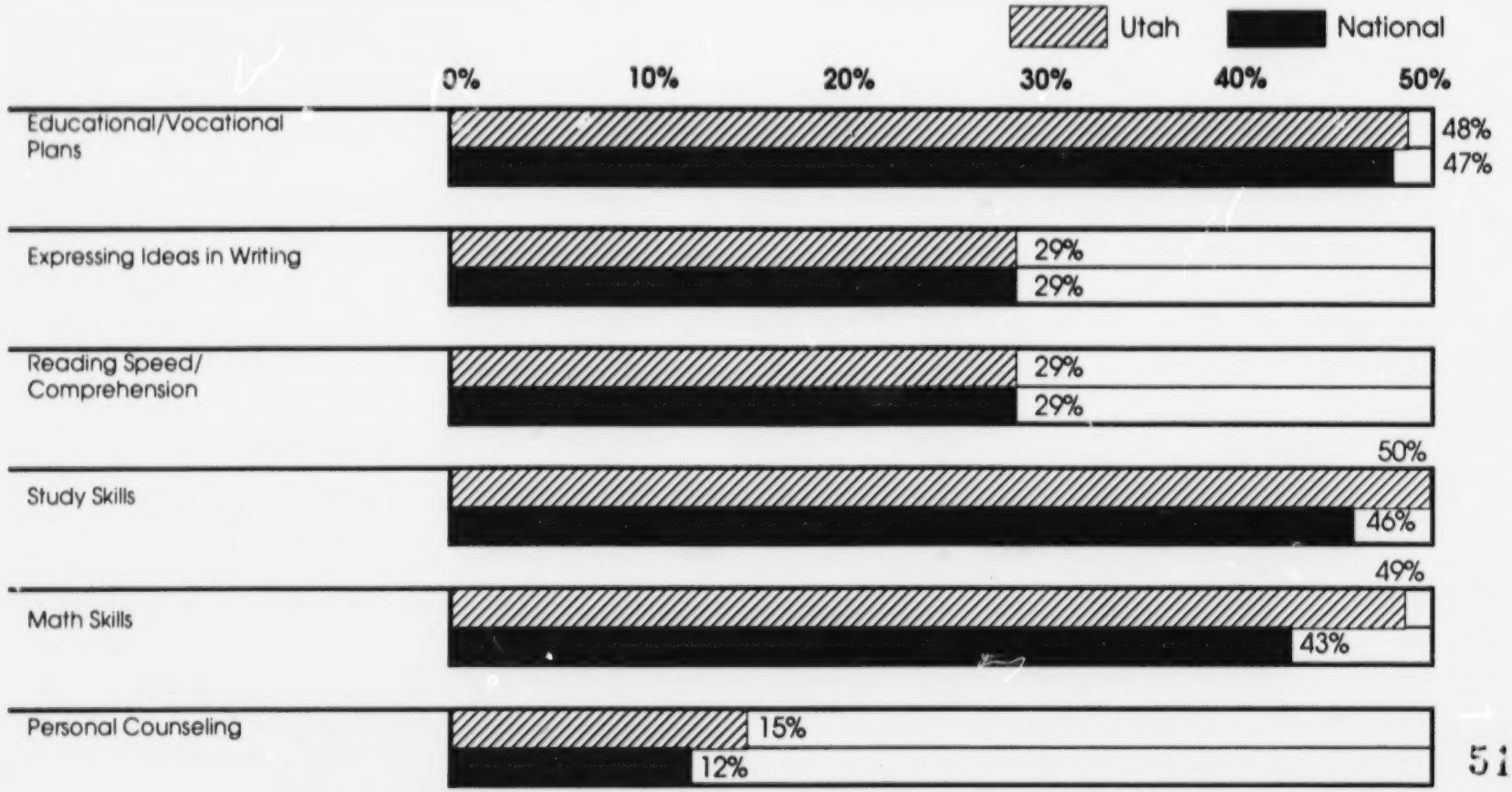


Source: ACT High School Profile Report, 1988

Students Requesting Educational Assistance - Exhibit 14. Exhibit 14 shows a comparison between Utah and national ACT test-takers in respect to the percentages of students requesting educational assistance in several areas. Utah and national percentages are rather similar for such areas as educational and vocational planning, expressing ideas in writing, and reading speed and comprehension. In the areas of study skills, math skills, and personal counseling, however, a higher percentage of Utah ACT test-takers report needing help. It would seem significant that the relatively high percentage of Utah students who feel they will need help at the college level in such areas as study skills and math skills has not changed substantially over several years. The broad picture which emerges here is that a rather high percentage of college-bound Utah students could benefit from increased emphasis in the areas indicated.

EXHIBIT 14

Percentage of Utah Students Who Requested Educational Assistance Compared to the National ACT Group, 1988



Source: ACT High School Profile Report, 1988

III. SCHOLASTIC APTITUDE TEST (SAT) RESULTS

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SCHOLASTIC APTITUDE TEST (SAT) RESULTS

The Scholastic Aptitude Test (SAT), administered by the College Entrance Examination Board, is a second major college entrance examination taken by students seeking to enter college in this country. Nationally, nearly one million students take the SAT annually. In the state of Utah, however, where no institution of higher education requires the SAT exclusively, only 1,378 students took the SAT in 1988. This number is somewhat greater than the number of students taking the test in previous years, but as a percentage of the total number of students in the graduating class of 1988, the number is very small (6% compared to over 65% who take the ACT). Utah students who do take the SAT often aspire to attend colleges or universities in the eastern United States. Thus, this group of test-takers is far more select than is the group taking the ACT in Utah.

The College Board publication, Taking the SAT, describes the test as follows:

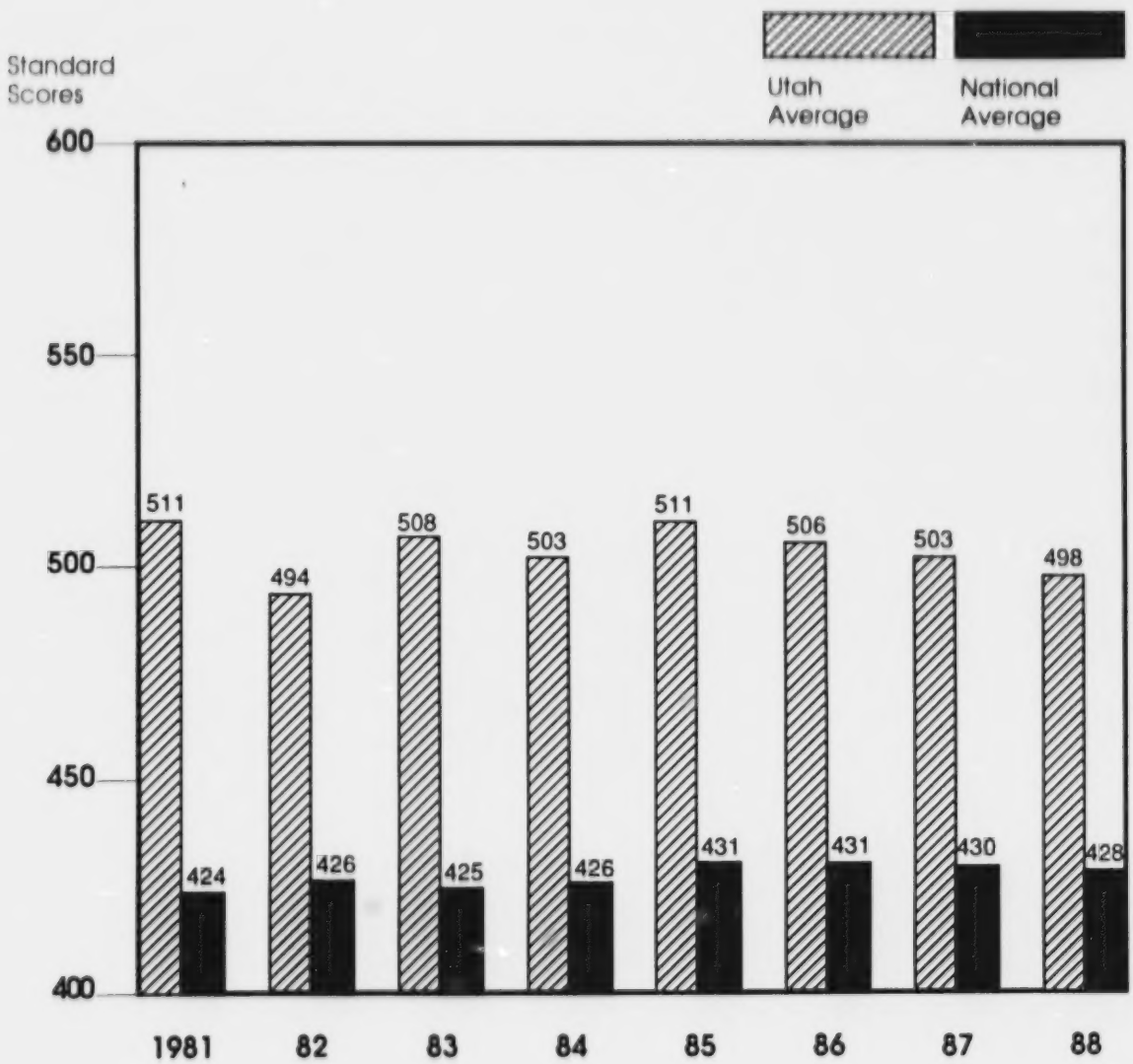
> The SAT is a multiple choice test made up of separately timed verbal and mathematical sections. Verbal questions measure your ability to understand what you read, and the extent of your vocabulary. Mathematical questions measure your ability to solve problems involving arithmetic reasoning, algebra, and geometry.
>
> SAT-Verbal Sections. There are four types of questions in the verbal sections of the SAT: twenty-five antonyms, fifteen analogies, twenty sentence completions, and twenty-five questions based on reading passages.
>
> SAT - Mathematical Sections. Some questions in the mathematical sections of the SAT require you to apply numerical, graphic, spacial, symbolic and logical techniques to situations familiar to you; these may be similar to exercises in your textbooks. Other questions may require you to do some original thinking. The mathematical preparation expected is a year of algebra and some geometry.

Utah and National SAT Average Scores - Exhibits 15 and 16. As was indicated above, any comparison of Utah and national Scholastic Aptitude Test average scores must be made with full knowledge that the Utah students taking the SAT are a much more select group than the national group of seniors who take this test. For the period of time between 1981 and 1988, which is depicted in Exhibits 15 and 16, the highest number of Utah students to take the SAT was 1,378 in 1988. During the same year, approximately one million high school seniors took the SAT nationally.

Exhibits 15 and 16 document the slight increase in national SAT verbal and mathematics scores which has characterized the last eight years. Due to the small number of Utah students who take the Scholastic Aptitude Test, the yearly averages for the Utah group of students fluctuate much more than does the national average. As would be expected from knowledge of the composition of both the Utah and national group of test-takers, the Utah scores are substantially higher on both the verbal and mathematics test than are those for the national group of test-takers. This finding is largely attributable to the much smaller percentage of Utah seniors taking the test than would be the case in a typical SAT state.

EXHIBIT 15

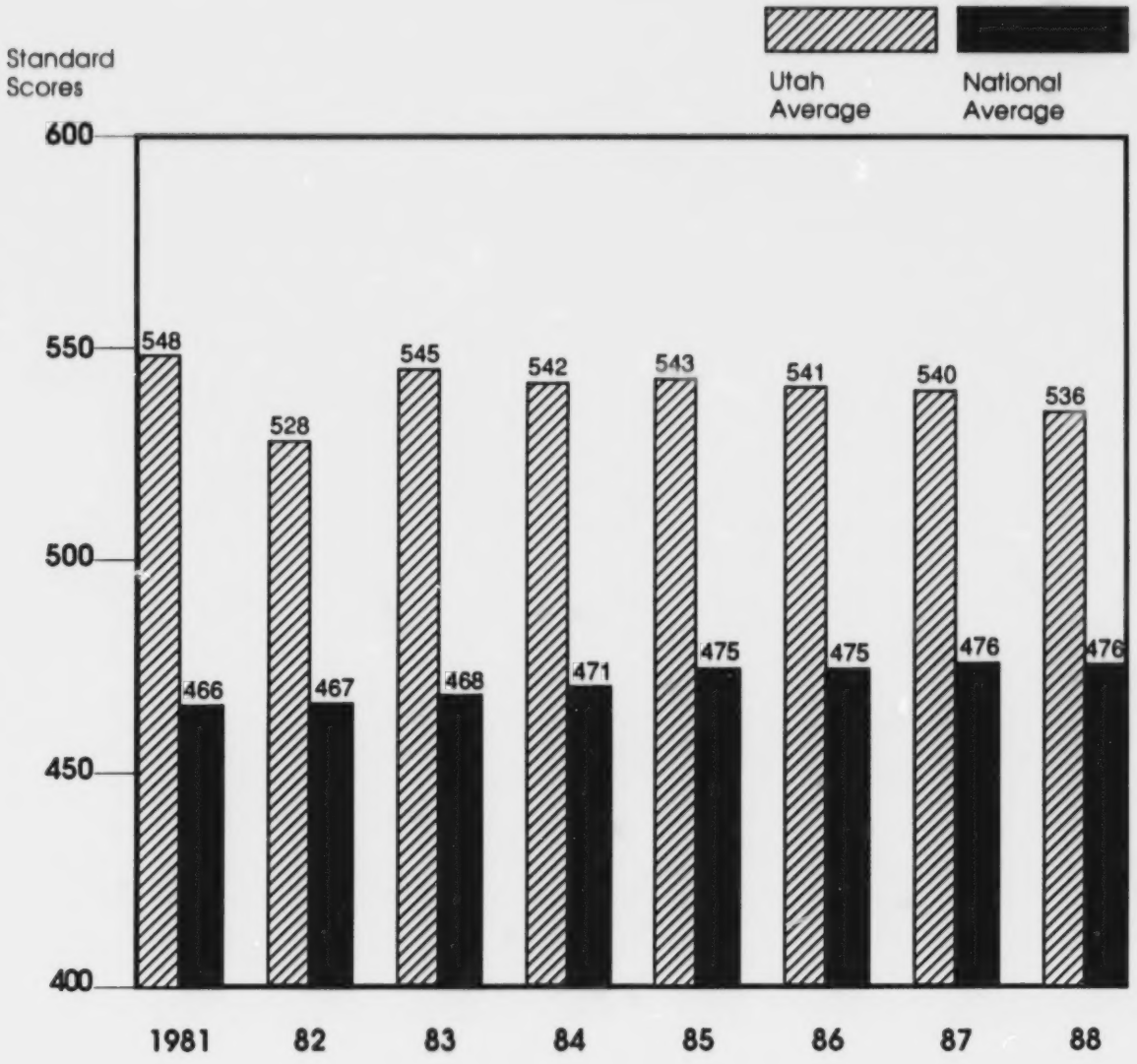
Utah vs. National SAT Average Verbal Scores



Source: College Board ATP Summary Reports, 1981-88

EXHIBIT 16

Utah vs. National SAT Average Mathematics Scores



Source: College Board ATP Summary Reports, 1981-88

IV. PRELIMINARY SCHOLASTIC APTITUDE TEST (PSAT) RESULTS

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PRELIMINARY SCHOLASTIC APTITUDE TEST (PSAT) RESULTS

The Preliminary Scholastic Aptitude Test is taken in October by over one million college-bound high school juniors across the United States. The PSAT (also known as the National Merit Scholarship Qualifying Test - NMSQT), is taken by students who hope to compete successfully for scholarships sponsored by the College Board. In structure, the PSAT is similar to the Scholastic Aptitude Test, with a verbal section measuring antonyms, sentences, analogies, and reading comprehension and a mathematics section measuring "regular" math, and quantitative comparison.

The number of Utah students taking the PSAT has risen substantially over the last several years. The 1987 group of PSAT test-takers in Utah consisted of 4,832 students. Thus, while the group of students taking the PSAT in Utah is not as select as the group taking the SAT, the Utah students still likely comprise a more select group than would be characteristic of many other states.

PSAT standard scores range between 20 and 80 for a particular student with state or national averages most often fluctuating in the range between 40 and 50.

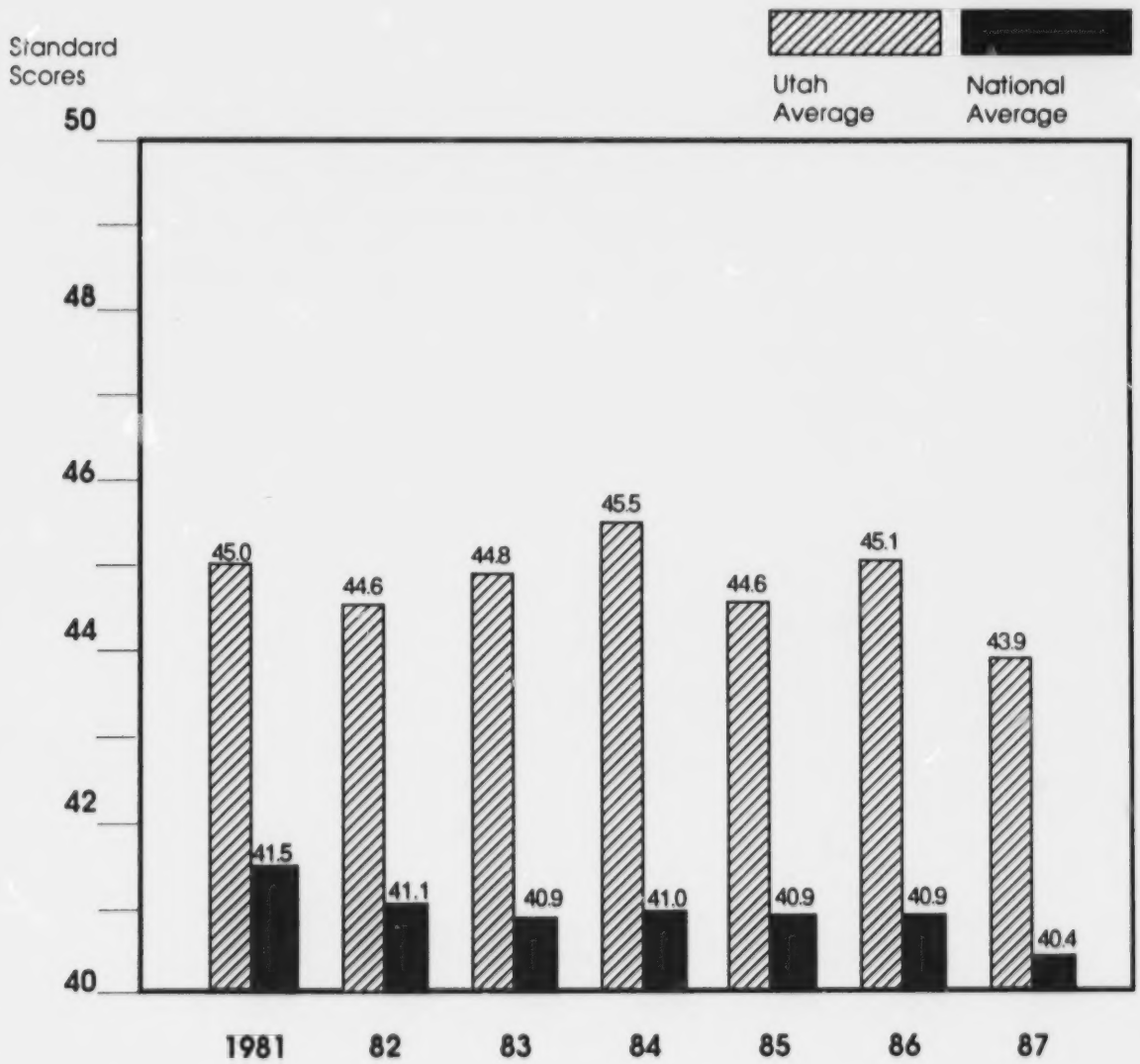
PSAT Verbal and Mathematics Results - Exhibits 17 and 18. Exhibit 17 presents the profile of PSAT average verbal scores for Utah and the nation between 1981 and 1987. During this period of time national PSAT scores have actually declined from a high of 41.5 in 1981 to a low of 40.4 in 1987. Due to the much smaller number of Utah students taking the PSAT than is the case nationally, Utah average scores are much more subject to fluctuation over time. Utah PSAT verbal scores were much higher than those observed for the

national group of PSAT test-takers in each of the seven years illustrated in Exhibit 17.

Exhibit 18 presents PSAT average mathematics scores for Utah and the nation. Here, the national averages are again rather stable from 1981 through 1987. As was true with the verbal scores, the Utah PSAT mathematics averages show more variability than do the national scores. Utah PSAT mathematics performance over this period of time is substantially higher than that of the national group. Again, it must be stressed that the PSAT (as is the case with the SAT and ACT) is a test which is taken by a self-selected group of students. The interpretation of trends in PSAT scores at the state level is made more difficult by this factor in conjunction with the rather small number of Utah students who take the test.

EXHIBIT 17

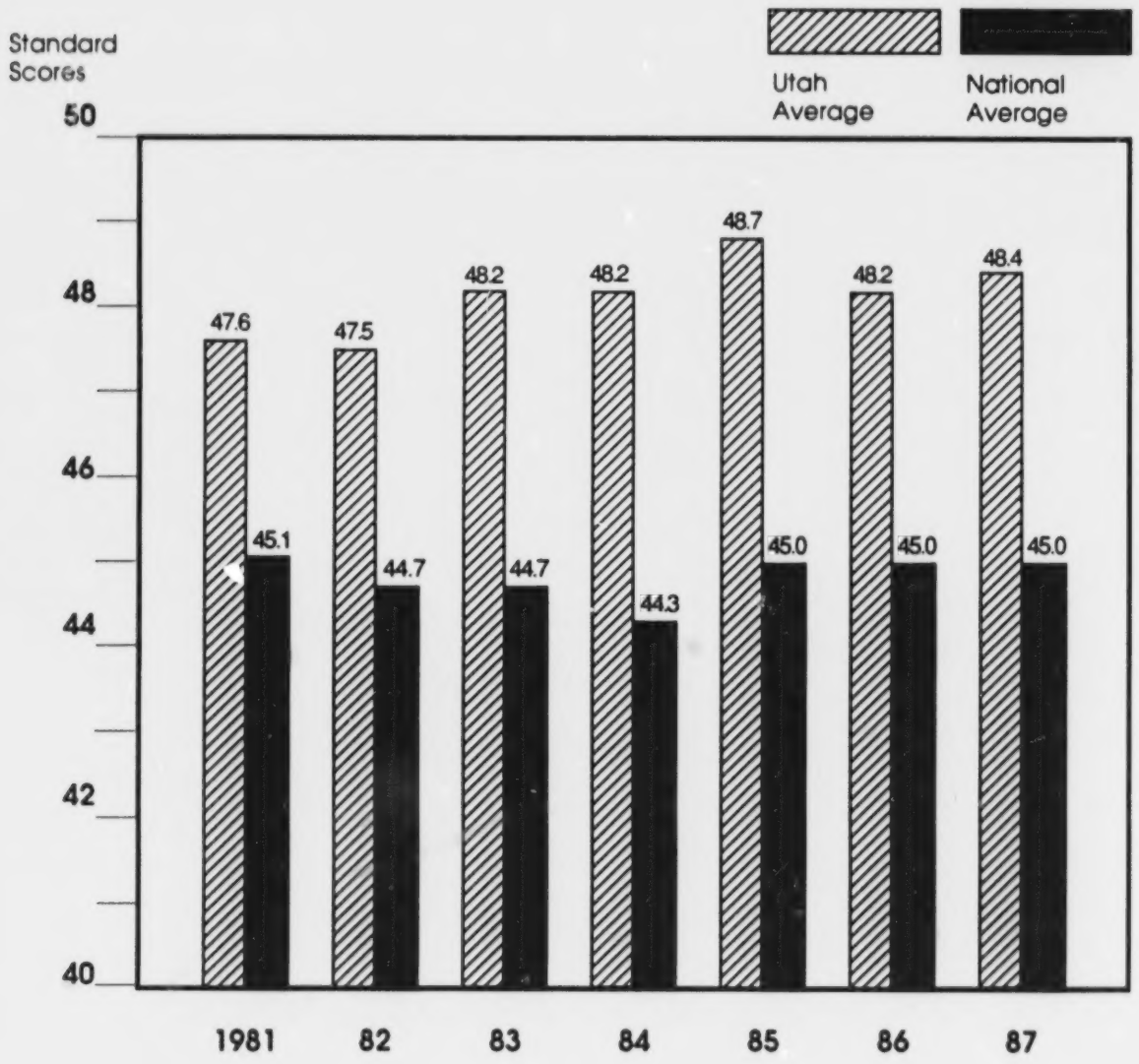
Utah vs. National PSAT Average **Verbal** Scores



Source: College Board PSAT Summary Reports, 1981-87

EXHIBIT 18

Utah vs. National PSAT Average **Mathematics** Scores



Source: College Board PSAT Summary Reports, 1981-87

V. UTAH STATEWIDE EDUCATIONAL ASSESSMENT PROGRAM RESULTS

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UTAH STATEWIDE EDUCATIONAL ASSESSMENT PROGRAM RESULTS

Utah educators, citizens, and legislators have traditionally been concerned with improving educational practice. The Utah State Legislature has charged the State Board of Education and its staff with accomplishing various evaluation activities including a program of statewide educational assessment. In 1977, the legislature expressed its intent that the State Board of Education mount a continuing assessment program built on the model first implemented by State Office of Education in 1975. Since that time, major assessments have been conducted every three years with appropriate instrument development, refinement, and reporting activities taking place between the major assessment dates. The Utah Statewide Educational Assessment program measures the basic mathematics, reading, and English skills achievement of Utah students as well as other important areas of educational focus such as student academic self-concept, attitude toward school, and peer relations skills.

Several different types of information have been collected in the five statewide assessment studies accomplished to date. The first type, student academic achievement, was measured using the Comprehensive Tests of Basic Skills (CTBS). Form S of the CTBS was used in the 1975, 1978, and 1981 studies, while Form U was implemented for the 1984 and 1987 studies. The measurement of the status of Utah students in respect to important non-cognitive educational goals, including such areas as academic self-concept and peer relations, was accomplished with carefully developed instrumentation built specifically for the Utah assessment program. All five Utah assessment efforts have also included measures of a variety of demographic characteristics which may influence student achievement. Measurement devices have

also been included which collected information on instructional strategies used by teachers to help students learn. The purposes behind this wide spectrum of measures were: (1) to provide an accurate picture of the achievement of students in Utah's public schools; (2) to provide an indication of how certain critical demographic factors are related to the way students achieve; and (3) to provide some insight into instructional approaches and techniques which influence student achievement and attitudes. All five Utah Statewide Assessment studies have examined the academic performance and other characteristics of Utah students at grades 5 and 11. Nearly 100 elementary and secondary schools have been included in each of the five assessments. In the 1987 study, nearly 8,000 Utah fifth and eleventh grade students were tested.

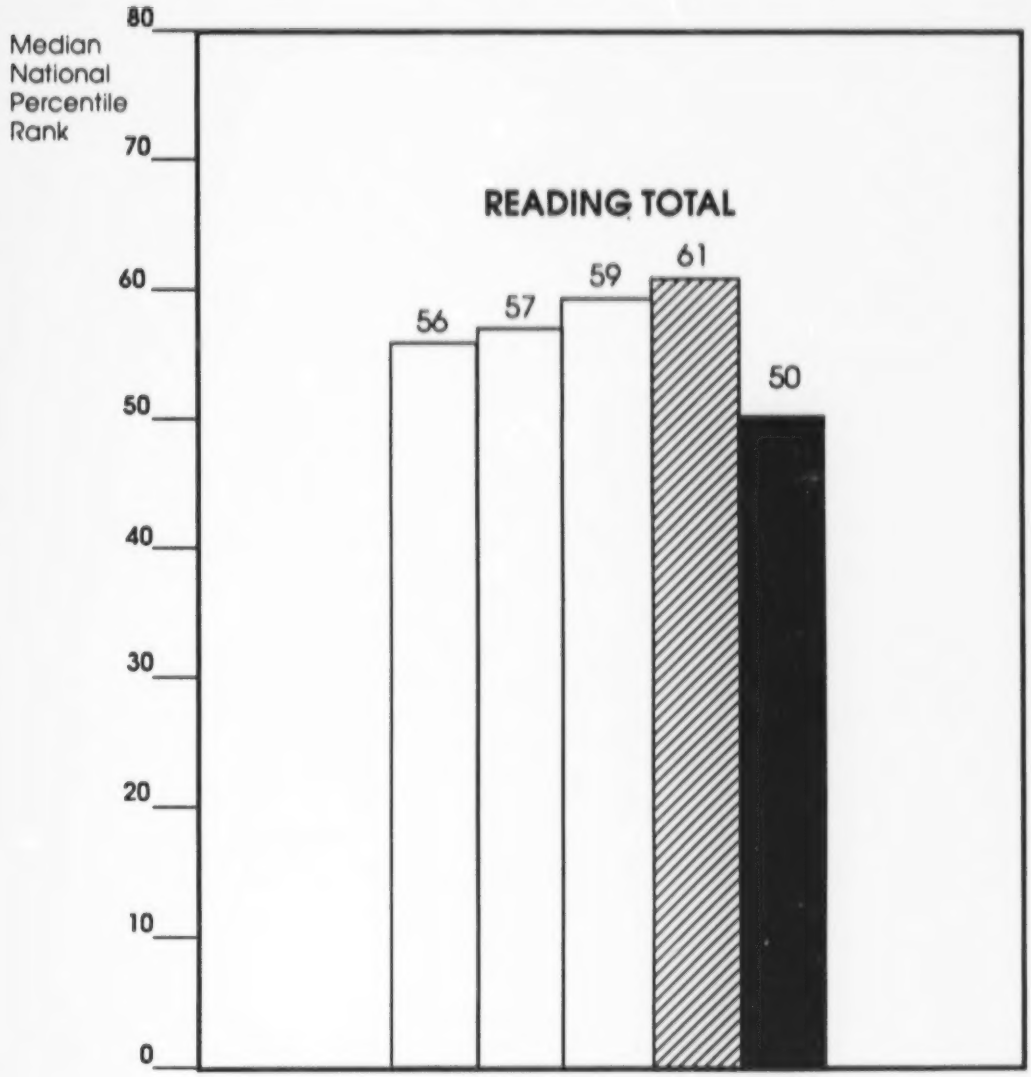
Basic Skills Achievement of Utah Students

The results from all five of the statewide assessment studies have been made available previously in a variety of reports and presentations. This report will highlight key findings from these studies.

Reading Achievement of Utah Fifth and Eleventh Grade Students - Exhibits 19 and 20. Exhibits 19 and 20 present the reading achievement results for Utah fifth and eleventh graders respectively. Exhibit 19 documents a steady, upward trend in the reading performance of Utah fifth graders from the initial assessment of reading in 1978 through 1987. In the most recent assessment, Utah fifth graders had a median national percentile rank of 61 compared to the national norm of the 50th percentile. This means that the typical fifth grade student in Utah obtained a higher score than 61% of the national norm group. When expressed as a grade equivalent, Utah fifth graders scored slightly less than one full grade equivalent higher than the national norm group.

EXHIBIT 19

Changes Across Time in Utah Results on CTBS **Reading** Total Score, Grade 5

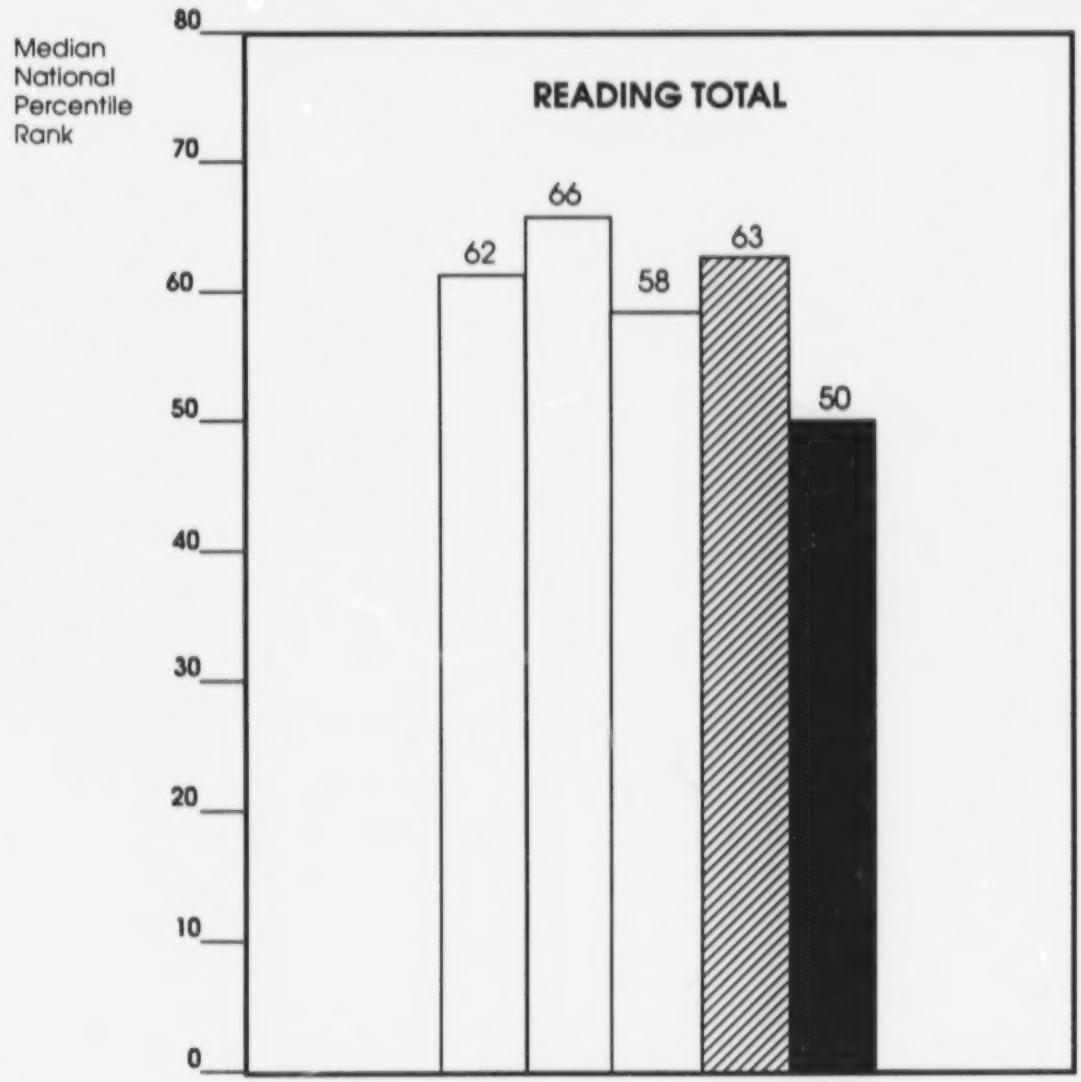


	UTAH 1978	UTAH 1981	UTAH 1984	**UTAH 1987**	1981 NAT'L NORM
MEDIAN GRADE EQUIVALENT	6.1	6.2	6.4	**6.6**	5.8

Source: Utah Statewide Educational Assessment General Report, 1987

EXHIBIT 20

Changes Across Time in Utah Results on CTBS **Reading** Total Score, Grade 11



	UTAH 1978	UTAH 1981	UTAH 1984	**UTAH 1987**	1981 NAT'L NORM
MEDIAN GRADE EQUIVALENT	12.9+	12.9+	12.9	**12.9+**	11.8

Source: Utah Statewide Educational Assessment General Report, 1987

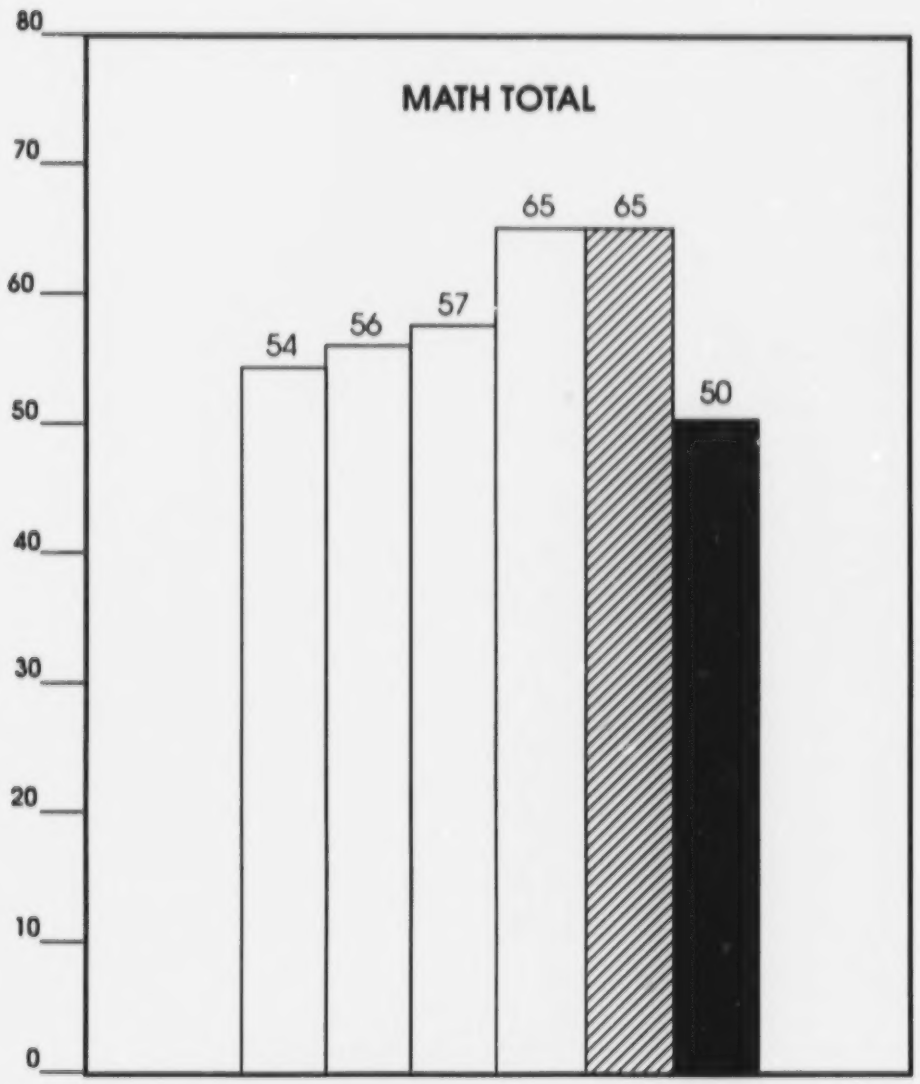
Exhibit 20 shows reading achievement scores for Utah eleventh graders. Utah eleventh grade students continued to perform well on the CTBS total reading score. A decline was noted between the 1981 and 1984 assessments. That is, Utah's performance was still considerably above the national norm, but at a comparatively lower level than in previous years. Utah's 1987 average climbed to the 63rd percentile. This placed the typical Utah eleventh grade student at more than a full grade equivalent higher than the national norm.

Mathematics Achievement Results for Utah Fifth and Eleventh Grade Students - Exhibits 21 and 22. Exhibits 21 and 22 present the results from the five assessments of mathematics between 1975 and 1987. Exhibit 21 shows modest increases in mathematics performance of Utah fifth graders between 1975 and 1981. The 1984 assessment marked a substantial increase in the mathematics performance of Utah fifth graders which was sustained in 1987. As of the 1987 assessment, the typical Utah fifth grader scored at the 65th percentile of the national norm group. This means that the typical Utah fifth grader scores higher than 65% of the students in the national group. When performance is expressed in terms of grade equivalents, Utah fifth graders score just under a full grade equivalent higher than the national norm.

Exhibit 22 presents results on the CTBS mathematics total score for Utah eleventh graders. Eleventh grade scores showed a decline between 1975 and 1978 for the state. Since 1978 rather substantial improvement in basic skills mathematics achievement has been noted in the performance of Utah eleventh graders. The 1987 results show that the typical Utah eleventh grader scores at the 62nd percentile compared to the national norm of 50. This level of performance is also one full grade equivalent higher than the national norm.

EXHIBIT 21

Changes Across Time in Utah Results on CTBS **Mathematics** Score, Grade 5

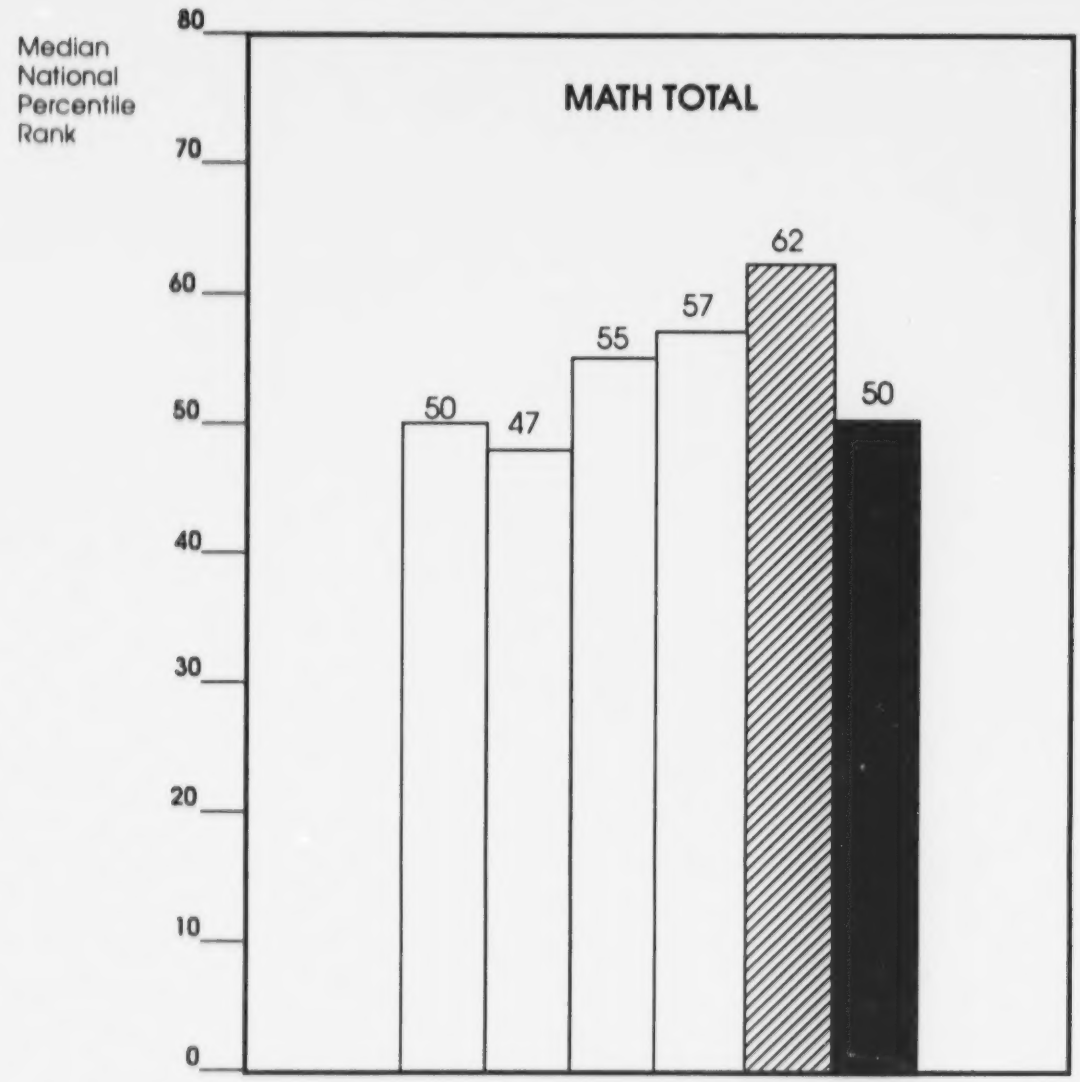


	UTAH 1975	UTAH 1978	UTAH 1981	UTAH 1984	**UTAH 1987**	1981 NAT'L NORM
MEDIAN GRADE EQUIVALENT	5.9	6.0	6.1	6.5	**6.5**	5.8

Source: Utah Statewide Educational Assessment General Report, 1987

EXHIBIT 22

Changes Across Time in Utah Results on CTBS **Mathematics** Score, Grade 11



	UTAH 1975	UTAH 1978	UTAH 1981	UTAH 1984	**UTAH 1987**	1981 NAT'L NORM
MEDIAN GRADE EQUIVALENT	11.8	11.4	12.7	12.9	**12.9+**	11.9

Source: Utah Statewide Educational Assessment General Report, 1987

Student Attitudes and Other Characteristics

In keeping with the broad spectrum, goal-based philosophy of Utah's Statewide Educational Assessment program, basic skills achievement was only one facet of educational performance measured in the five studies. Several measures were used to assess student educational outcomes in non-cognitive areas. Results from key scales in these other areas are presented in the following sections.

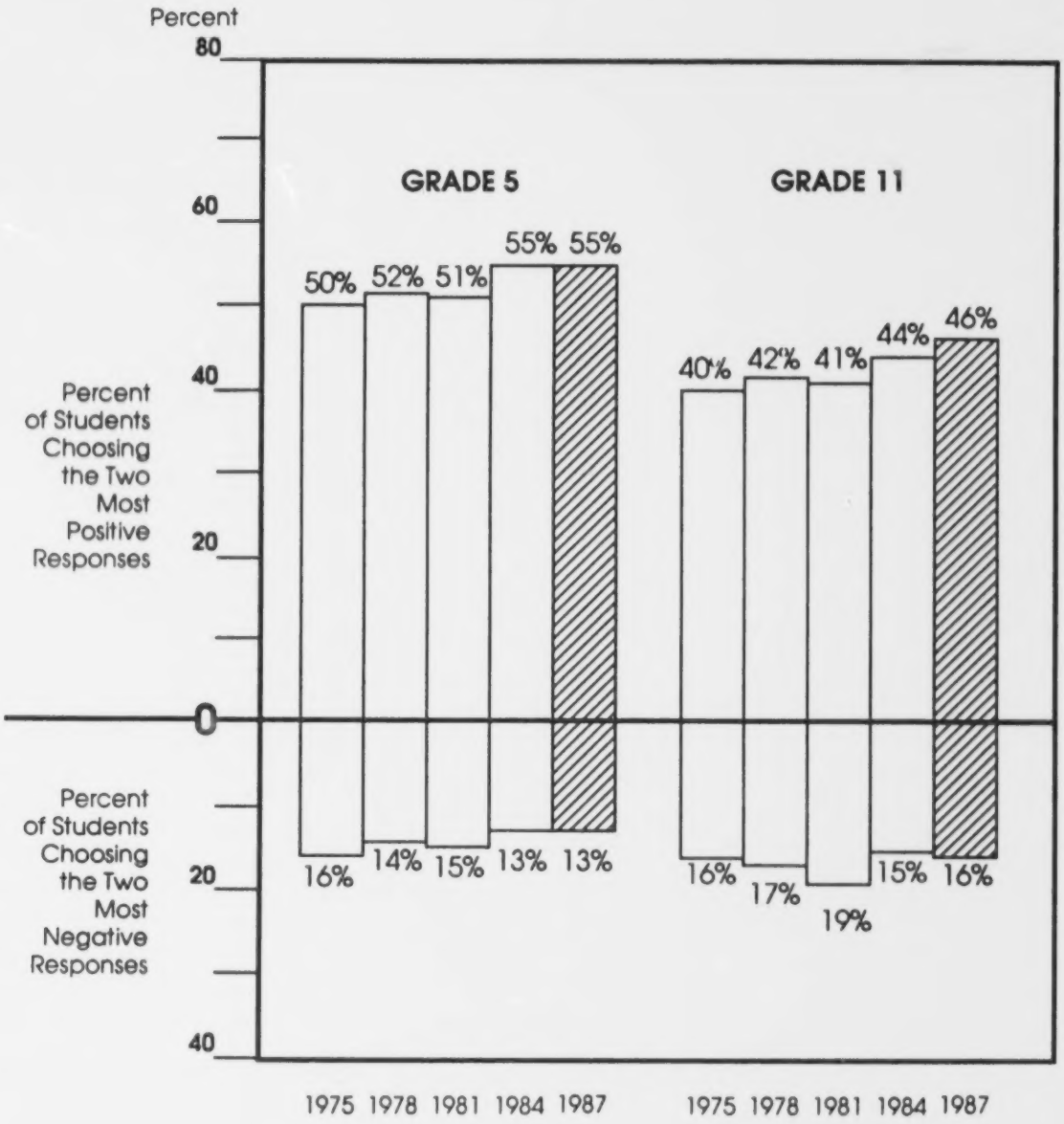
Results From the Academic Self-Concept Scale - Exhibit 23. The academic self-concept scale is targeted on the areas of enhancing positive self-image and developing an accurate insight into one's own capabilities and limitations. This scale measures students' confidence in their academic abilities by asking them to describe their ability to learn things quickly, to plan, to persevere, to work independently, and to remember. Exhibit 23 shows that the percentages of Utah fifth and eleventh grade students choosing the two most positive responses on the items in this scale have increased at both grade levels between 1975 and 1987. Relatively large percentages of students at both grade levels endorsed positive self-descriptions on this scale, and relatively small percentages marked negative self-descriptions. In general, students have lower academic self-concept scores in the eleventh grade than is observed at grade five. There apparently is no automatic tendency for students to feel more positive about themselves as learners as they grow older. This emphasizes the importance of school policies and goals which develop success experiences and reduce failure, without lowering standards.

Results From the Peer Relations Scale - Exhibit 24

The peer relations scale measured students' levels of interpersonal skills including cooperative skills, ability to help others solve problems

EXHIBIT 23

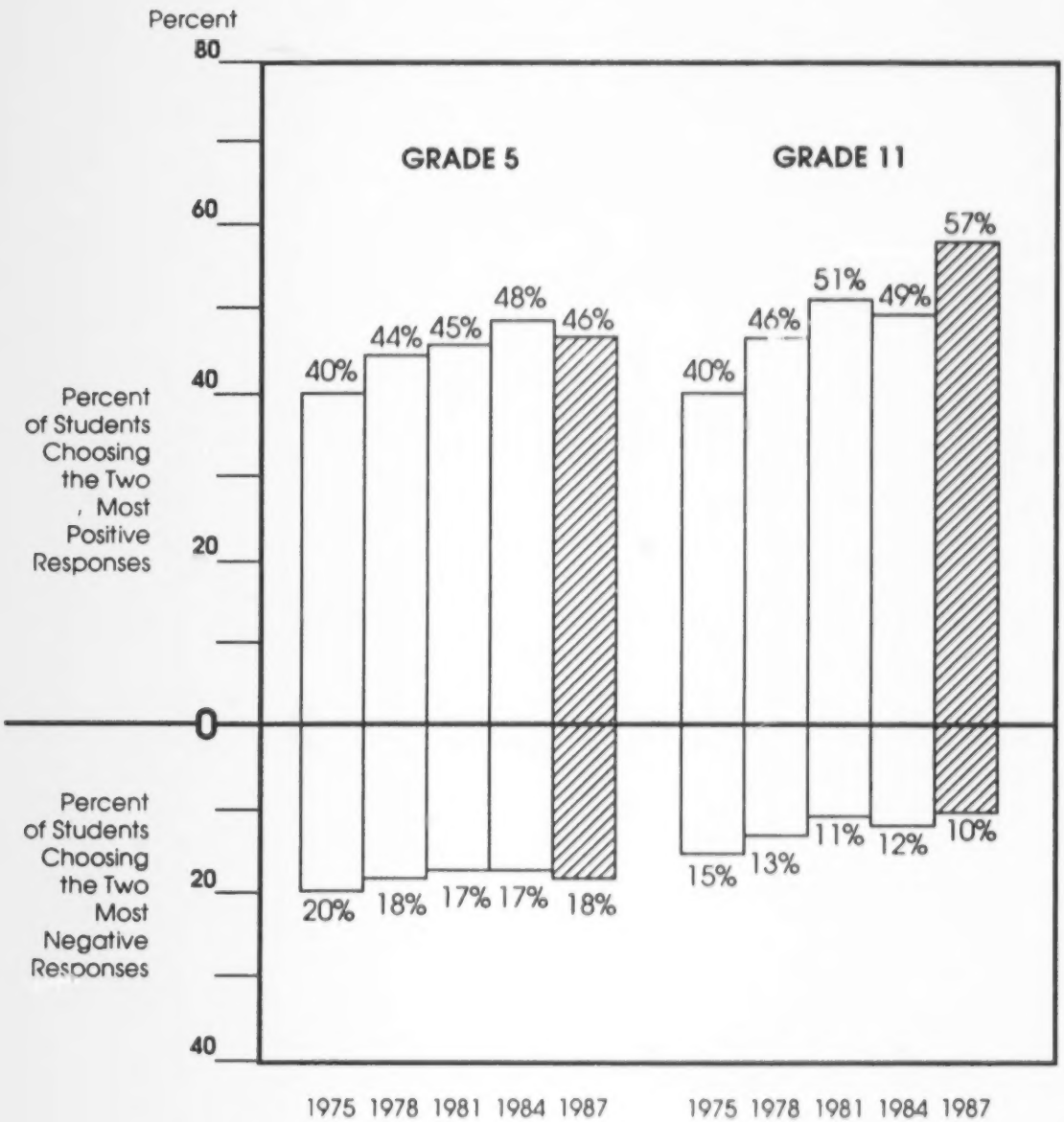
Results from the Academic **Self-Concept** Scale, Grades 5 and 11



Source: Utah Statewide Educational Assessment General Report, 1987

EXHIBIT 24

Results from the **Peer Relations** Scale, Grades 5 and 11



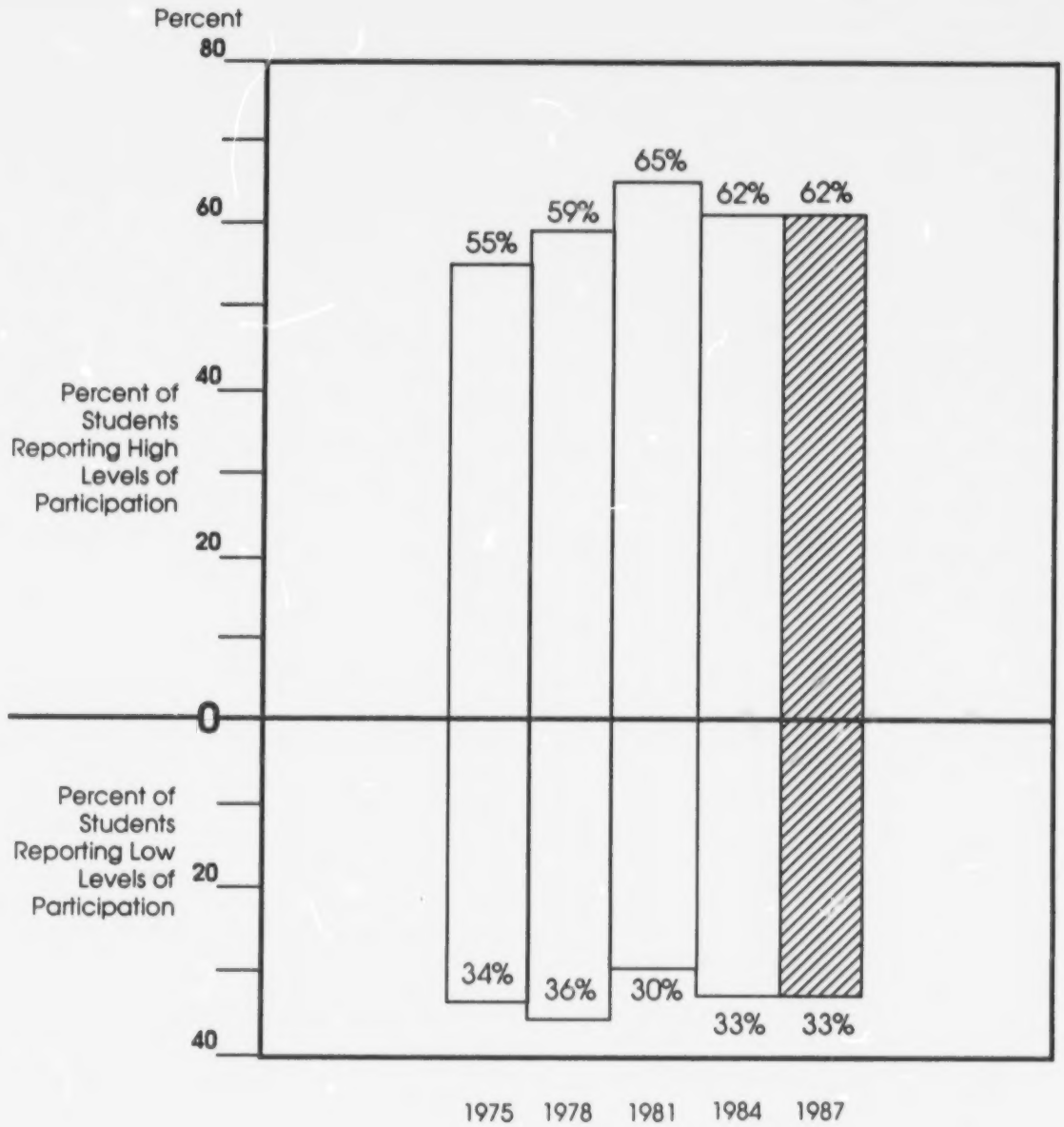
Source: Utah Statewide Educational Assessment General Report, 1987

and accomplish tasks, and ability to take responsibility. Exhibit 24 shows that the percentages of students choosing the two most positive self-descriptions in this area have increased systematically at grade five over a twelve-year period. Much the same pattern is noted with the eleventh grade results. Over the entire period from 1975 to 1987, both fifth and eleventh grade students generally reported increasing peer relations competence, indicating an increasingly effective level of social development for Utah students over the long term.

Results From the Career Awareness and Exploration Scale - Exhibit 25. The career awareness and exploration scale was used at the eleventh grade level to measure student awareness, planning, and initiative in dealing with career choices. Students with high scores on this scale had considered what kinds of training or education were necessary for certain jobs, had made some plans about how much education they wanted after high school, and had made some definite plans about a future career or job. Exhibit 25 shows that the scores of Utah eleventh graders on this scale have increased significantly between 1975 and 1987, although the 1987 score levels are somewhat lower than the 1981 scores. A rather disturbing finding from these results is that about one-third of the eleventh graders in any given year had devoted little attention to finding out about and planning a future career. Thus, while these results show that some of the goals of career education are being met and gradual improvement is occurring, there are real opportunities for additional growth. The substantial percentage of students reporting low levels of career awareness could certainly benefit from more emphasis on examining and exploring career opportunities.

EXHIBIT 25

Results from the **Career Awareness and Exploration** Scale, Grade 11



Source: Utah Statewide Educational Assessment General Report, 1987

Results From the Enjoyment of School Scale - Exhibit 26. Exhibit 26 presents the results for Utah fifth and eleventh graders from the enjoyment of school scale. Students with high scores on this scale reported that they almost always did a lot of things in school that they enjoyed, often got excited about what was happening in class, and often studied something they enjoyed learning about. The results shown in Exhibit 26 demonstrate lower enjoyment of school scores at both grade levels in 1987 compared to 1984. In spite of this recent decline, most Utah students do demonstrate positive attitudes toward school. Still, 20% of the fifth graders and 15% of the eleventh graders report low levels of enjoyment of school.

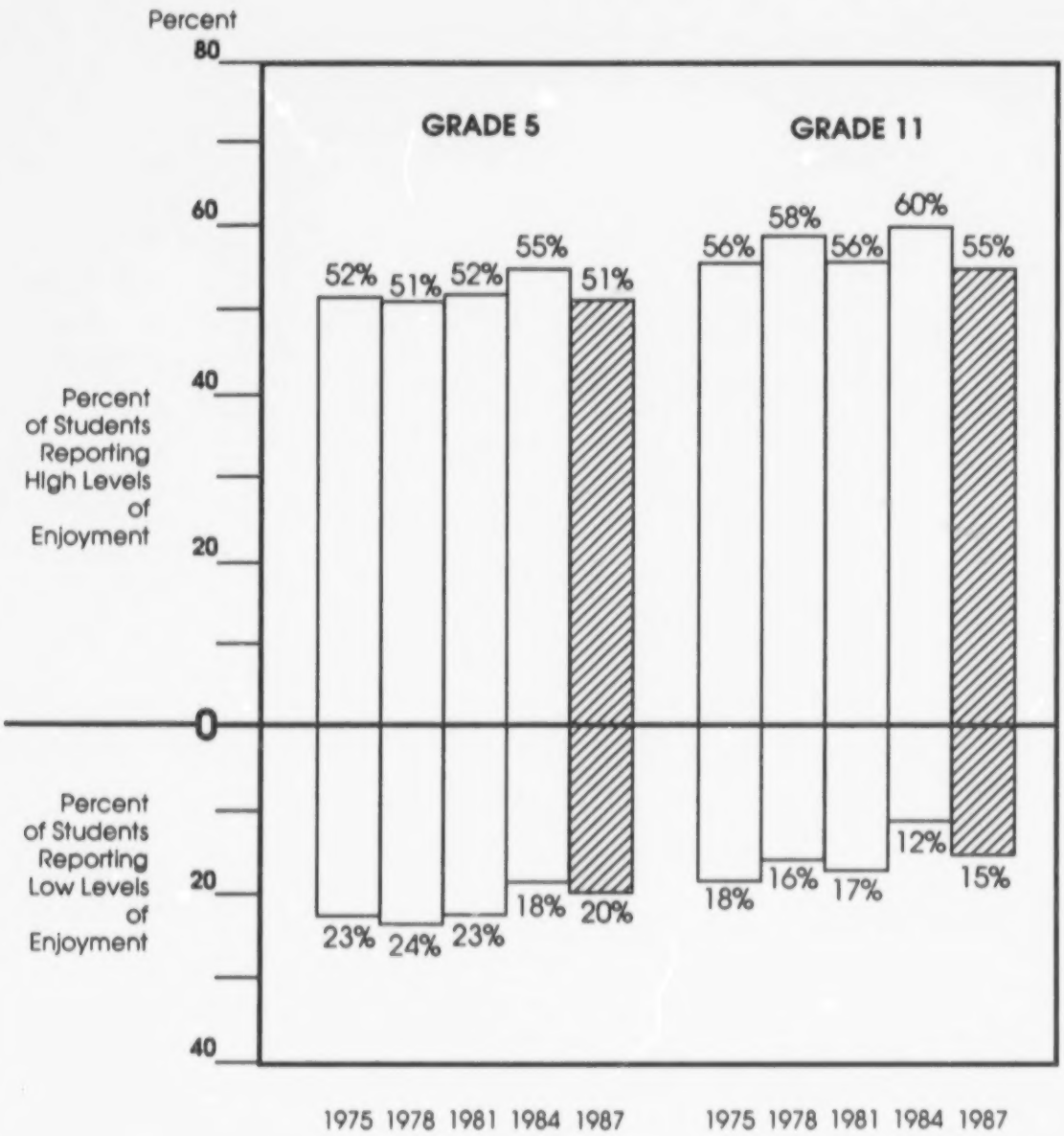
Profiles of Changes in Scores - Exhibits 27 and 28.

The 1987 Utah Statewide Educational Assessment results highlighted areas which were very strong and areas which could benefit from increased emphasis in the public schools. A comparison of the 1984 and 1987 Utah Statewide Educational Assessments showed different profiles of changes for the fifth and eleventh grade students.

Exhibits 27 and 28 illustrate the general profiles of results for the fifth and eleventh grades, respectively, showing the direction of changes in scores from 1984 to 1987. If the change in a score area was so slight as to be not statistically significant, then it was described as "stable" Otherwise, the direction of the change was indicated. For example, Exhibit 27 shows that the fifth grade score for CTBS Reading Total increased by a statistically significant amount (beyond what could be expected by chance), while CTBS Language Expression was stable (not changed by a significant amount).

EXHIBIT 26

Results from the **Enjoyment of School** Scale, Grades 5 and 11



Source: Utah Statewide Educational Assessment General Report, 1987

EXHIBIT 27

Profile of **Statistically Significant Changes** in Scores, 1984-87, Grade 5

Score Area	Change since 1984*
Basic Skills Achievement	
CTBS Reading Total	increase
CTBS Language Expression	stable
CTBS Mathematics Total	stable
Attitudes and Other Characteristics	
Academic Self-Concept	stable
Peer Relations	decrease
Independent Development	decrease
Enjoyment of School	decrease
Educational Processes	
Reinforcement of Self-Concept	stable
Development of Career Talents	stable
Expectations	decrease
Academic Learning Time	stable
Feedback	stable

* Only changes which are statistically significant ($p<.05$) are noted.

Source: Utah Statewide Educational Assessment General Report, 1987

EXHIBIT 28

Profile of **Statistically Significant Changes** in Scores, 1984-87, Grade 11

Score Area	Change since 1984*	
Basic Skills Achievement		
CTBS Reading	stable	
CTBS Mathematics	stable	
CTBS Mathematics Total		increase
Mathematics Class Experience		increase
Attitudes and Other Characteristics		
Academic Self-Concept	stable	
Peer Relations		increase
Extracurricular Activiites		increase
Independent Development	stable	
Career Development Experiences	stable	
Career Awareness and Exploration	stable	
Enjoyment of School	decrease	
Educational Processes		
Academic Learning Time	stable	
Feedback	stable	

* Only changes which are statistically significant ($p<.05$) are noted.

Source: Utah Statewide Educational Assessment General Report, 1987

At the fifth grade level, as depicted in Exhibit 27, there was one statistically significant increase out of the twelve measures which were used in both 1984 and 1987 -- the CTBS Reading Total score. Areas of concern, marked by substantial decreases, were expectations and enjoyment of school, while peer relations and independent development also decreased by statistically significant amounts.

At the eleventh grade level, as depicted in Exhibit 28, the results were more encouraging. Of the thirteen measures used in both 1984 and 1987, four increased by significant amounts while eight measures remained stable. The gains were observed on the CTBS mathematics total score, mathematics class experience, peer relations, and extracurricular activities. A significant decrease was noted only on enjoyment of school.

VI. ADVANCED PLACEMENT PROGRAM (AP) RESULTS

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ADVANCED PLACEMENT PROGRAM RESULTS

The Advanced Placement Program, sponsored by the College Entrance Examination Board, is designed to assist high schools across the nation in meeting the needs of academically gifted students. Advanced Placement (AP) accomplishes this by providing three basic services: first, AP assists high schools in developing college-level courses for academically talented students. Second, a national program of testing, scoring, and reporting is provided in the academic areas for which AP furnishes curriculum direction. Finally, test results are provided to colleges specified by students and serve as one criterion for granting students college credit for superior high school achievement.

Utah Advanced Placement Participation and Overall Performance

Participation of Utah students and high schools in the AP program has been extraordinarily high since Utah became affiliated with AP in 1962. On the basis of examinations taken per capita, Utah is consistently the first-ranked state in the Advanced Placement program. Thus, a much higher percentage of Utah students take AP exams than in any other state in the nation. Exhibit 29 documents overall Utah participation and performance. In 1988, 8,954 AP exams were taken by 5,831 Utah students. Those numbers represented nearly 2,000 more exams and over 1,000 more students participating in the program than just two years previous. Thus, Utah not only leads the nation in Advanced Placement program participation, but continues to widen its lead. Exhibit 29 also shows that the overall performance of Utah students on AP tests has increased at the same time more students have been taking the exams; this is a truly remarkable accomplishment.

The Advanced Placement Scoring System

Scoring the AP exams has remained much the same since the program's introduction into the state. Each exam is graded and assigned one of the following scores:

5 - Extremely well qualified
4 - Well qualified
3 - Qualified
2 - Possibly qualified
1 - No recommendation

College credit is granted by all institutions of higher education in the state for scores of 3 or above. Some colleges outside of Utah also award credit for a score of 2.

Advanced Placement Results in Five Subject Areas: 1966-1985

Exhibits 30 through 34 present comparisons between Utah and national Advanced Placement results for the American History, Biology, Chemistry, English, and Mathematics tests for the period from 1966 through 1985. Each exhibit portrays the results for students who elected to take the AP test in a particular subject area. For each of the years presented, the total number of students taking the subject area test is displayed, as is the average (mean) grade obtained by that group of students and the percentage of students who received a "qualified" grade of three or higher.

American History - Exhibit 30. The performance of Utah students on the Advanced Placement History exam over the seventeen-year period portrayed in Exhibit 30, has improved consistently from the early 1970's through 1988. The 1988 Utah average score is actually higher than the national figure by a slight margin. Given the very large increase in the number of Utah students taking the American History test between 1982 and 1988, the fact that the state average rivals the national average is a significant achievement in

EXHIBIT 29

Utah Advanced Placement Participation and Performance, 1982-88

Year	Total Students	Total Exams Taken	Percentage Qualified*	
			Utah	Nation
1982	2,329	3,094	**64.3%**	69.8%
1983	2,685	3,669	**67.5%**	70.3%
1984	3,355	4,695	**67.1%**	70.0%
1985	4,272	6,148	**66.6%**	67.2%
1986	4,738	7,010	**67.8%**	68.7%
1987	5,390	7,970	**67.4%**	67.7%
1988	5,831	8,954	**70.7%**	67.3%

*Percentage of exams with a grade of 3 or higher
Source: The College Board

EXHIBIT 30

Utah and National Advanced Placement Results in **American History**, 1972-88

	UTAH			NATIONAL		
Year	Total Students	Mean Grade	Percent* Qualified	Total Students	Mean Grade	Percent* Qualified
1972	449	2.5	40%	12,964	3.0	61%
1973	407	2.6	45%	12,720	3.0	64%
1974	435	2.6	49%	14,331	3.0	65%
1975	482	2.7	54%	16,068	3.1	67%
1976	476	2.8	60%	18,718	3.1	68%
1977	482	2.9	58%	21,325	3.1	68%
1978	490	2.8	55%	24,444	3.2	70%
1979	655	2.7	51%	28,222	3.1	67%
1980	670	2.7	53%	32,098	3.1	67%
1981	755	2.7	51%	35,999	3.1	66%
1982	830	2.9	58%	38,286	3.1	66%
1983	1,015	2.9	62%	43,844	3.1	67%
1984	1,358	3.0	60%	49,939	3.1	66%
1985	1,632	3.1	66%	58,932	3.1	65%
1986	1,890	3.0	64%	67,329	3.1	66%
1987	2,083	2.9	59%	76,509	3.0	61%
1988	2,193	3.1	67%	82,753	3.1	66%

* Percent of total students who qualified with a grade of three (3) or higher.
Source: The College Board

this curriculum area. The number of Utah students taking the AP American History test has risen dramatically over the period shown in Exhibit 30 from a low of 407 students in 1973, to a high of 2,193 in 1988.

Biology - Exhibit 31. Both state and national averages on the AP Biology test have been rather stable over the period from 1972 through 1988. In recent years, state and national averages are rather close, but favor the national group slightly. The AP Biology test is taken by far fewer Utah students than is the English or American History test. The 1988 results do show, however, a substantial rise in the number of students taking this exam with 910 doing so. This is nearly a 1,000% increase over the number of students taking the same test ten years earlier.

Chemistry - Exhibit 32. The number of students within the state taking the AP Chemistry test has grown substantially from 1972 through the present. This test still remains far less popular than the other academic core AP areas. The performance of Utah students on the Chemistry test has been quite consistent for the entire seventeen-year period shown in Exhibit 32, and is very much like the national levels of performance. In the most recent results, Utah students taking the AP Chemistry exam achieved an average score of 3.1 with 71% of these students achieving a qualifying grade of three or above.

English - Exhibit 33. The same gradual upward trend in performance noted for the AP American History test results within the state of Utah is also evident in the AP English results. From a low of 56% of the Utah students qualifying in 1974, performance of students in the state has risen to a high of 74% qualifying in 1988. As with several other AP tests reviewed here, the participation of Utah students on the AP English test has risen substantially over the past ten years. Nearly 2,000 Utah students took this

EXHIBIT 31

Utah and National Advanced Placement Results in **Biology**, 1972-88

	UTAH			NATIONAL		
Year	Total Students	Mean Grade	Percent* Qualified	Total Students	Mean Grade	Percent* Qualified
1972	85	2.9	71%	5,967	3.0	68%
1973	97	2.9	70%	5,764	3.2	78%
1974	78	2.9	71%	7,411	3.1	74%
1975	113	2.8	66%	8,206	3.3	77%
1976	130	2.9	71%	9,482	3.3	79%
1977	103	3.3	81%	10,530	3.4	80%
1978	97	3.1	63%	11,342	3.4	80%
1979	130	2.9	64%	12,835	3.3	78%
1980	170	2.9	65%	13,549	3.3	77%
1981	177	3.1	69%	15,199	3.4	77%
1982	219	3.1	68%	15,947	3.2	76%
1983	240	3.1	73%	17,804	3.3	75%
1984	377	3.0	69%	19,387	3.3	75%
1985	567	2.9	66%	22,801	3.1	70%
1986	655	3.0	64%	25,931	3.2	71%
1987	778	3.0	65%	28,415	3.1	67%
1988	910	3.0	63%	31,056	3.1	64%

* Percent of total students who qualified with a grade of three (3) or higher.
Source: The College Board

EXHIBIT 32

Utah and National Advanced Placement Results in **Chemistry**, 1972-88

	UTAH			NATIONAL		
Year	Total Students	Mean Grade	Percent* Qualified	Total Students	Mean Grade	Percent* Qualified
1972	99	2.8	61%	3,741	3.0	67%
1973	85	2.8	61%	3,447	3.0	68%
1974	112	3.0	77%	3,802	3.0	70%
1975	89	2.8	64%	4,181	3.1	70%
1976	134	2.9	59%	5,341	3.1	71%
1977	115	2.9	63%	5,559	3.1	71%
1978	119	3.0	72%	6,270	3.1	70%
1979	153	2.6	63%	7,016	3.1	69%
1980	193	2.9	61%	8,209	3.1	69%
1981	191	2.9	67%	8,877	3.0	69%
1982	164	2.7	57%	9,476	3.0	68%
1983	190	3.0	65%	10,291	3.1	68%
1984	221	3.0	70%	11,539	3.0	68%
1985	393	2.7	52%	13,352	2.9	62%
1986	364	2.9	64%	15,191	2.8	60%
1987	401	3.0	64%	16,034	3.0	65%
1988	336	3.1	71%	17,721	3.0	65%

* Percent of total students who qualified with a grade of three (3) or higher.
Source: The College Board

EXHIBIT 33

Utah and National Advanced Placement Results in **English**, 1972-88

	UTAH			NATIONAL		
Year	Total Students	Mean Grade	Percent* Qualified	Total Students	Mean Grade	Percent* Qualified
1972	840	2.8	66%	24,807	3.1	77%
1973	832	2.7	60%	22,422	3.1	74%
1974	913	2.7	56%	24,131	3.1	70%
1975	797	2.7	60%	25,656	3.1	72%
1976	911	2.8	59%	29,503	3.1	71%
1977	937	2.9	66%	32,142	3.1	72%
1978	1,090	2.9	67%	36,334	3.1	73%
1979	1,153	2.9	61%	41,975	3.1	70%
1980	1,081	2.9	67%	45,082	3.1	70%
1981	1,162	2.9	65%	48,605	3.1	70%
1982	1,085	2.9	63%	51,128	3.1	69%
1983	1,258	3.0	69%	56,432	3.1	70%
1984	1,416	3.0	69%	60,969	3.1	70%
1985	1,654	3.0	68%	68,590	3.1	68%
1986	1,750	3.0	67%	75,705	3.1	70%
1987	1,823	3.1	71%	83,122	3.1	70%
1988	1,974	3.1	74%	92,729	3.1	69%

* Percent of total students who qualified with a grade of three (3) or higher.
Source: The College Board

exam in 1988. This marked nearly a 1,000% increase since ten years earlier. The performance of Utah students on the AP English exam has increased at a very gradual rate since 1972. Interestingly, during the same period of time national performance has remained stable. As of 1988, 74% of the nearly 2,000 Utah students challenging this test have received a grade of three or higher. This is contrasted with 69% for the national group of test-takers in the same year.

Mathematics - Exhibit 34. The popularity of the Advanced Placement Mathematics test has risen tremendously between 1972 and 1988. In the most recent results, some 1,162 Utah students took this exam compared to only 200 in 1972. Since 1982, Utah students taking the AP Mathematics test have demonstrated somewhat higher scores than the national group of AP test-takers. In 1988, 82% of the Utah students taking the exam received a qualifying grade, compared to 68% nationally. This consistent, upward trend for Utah students is impressive indeed. The high performance marks are all the more noteworthy in view of the extraordinary rise in the number of students challenging the AP Mathematics test.

Overview of the Utah Advanced Placement Program and Student Performance

The most remarkable aspect of the Advanced Placement Program in the state of Utah is the access that this program has provided students to excellent instruction. Utah has a much higher per-capita participation rate than any other state in the nation in the Advanced Placement Program. This means it is likely that many more Utah students with lower academic ability participate and benefit from the AP program than would be the case in other states. In spite of this fact, Utah average scores in the five most popular AP tests compare very favorably with the national averages over an extended period of time.

EXHIBIT 34

Utah and National Advanced Placement Results in **Mathematics**, 1972-88

	UTAH			NATIONAL		
Year	Total Students	Mean Grade	Percent* Qualified	Total Students	Mean Grade	Percent* Qualified
1972	200	2.7	57%	10,611	2.8	59%
1973	207	2.9	59%	9,871	2.9	59%
1974	274	2.8	62%	11,213	2.8	60%
1975	277	3.1	72%	11,804	3.0	66%
1976	254	3.2	75%	13,076	3.0	67%
1977	331	3.2	71%	14,089	3.0	65%
1978	317	3.1	71%	15,774	3.0	67%
1979	348	3.3	76%	17,615	3.0	68%
1980	361	3.1	73%	20,096	3.0	69%
1981	463	3.1	72%	22,537	3.1	70%
1982	422	3.2	74%	23,825	3.1	70%
1983	518	3.2	73%	26,706	3.1	70%
1984	616	3.2	74%	30,583	3.1	72%
1985	829	3.2	71%	36,282	2.9	61%
1986	922	3.4	79%	40,790	3.1	68%
1987	1,006	3.4	80%	47,783	3.1	69%
1988	1,162	3.5	82%	54,208	3.1	68%

* Percent of total students who qualified with a grade of three (3) or higher.
Source: The College Board

Looking only at absolute numbers, Utah had more students participating in Advanced Placement than states with several times Utah's population. This high degree of access to programs for academically able students, as well as the high actual participation rate, constitute a significant component in the state's total secondary school program. The most recent Advanced Placement results indicate that over 20% of the students entering Utah's colleges and universities have already, through the Advanced Placement Program, earned significant amounts of college credit. This accomplishment constitutes a significant savings both for individual students and their parents as well as Utah tax payers.

VII. ADULT EDUCATIONAL ATTAINMENT IN UTAH

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ADULT EDUCATIONAL ATTAINMENT IN UTAH

The United States Census of 1970 and 1980, as well as the 1976 Survey of Income and Education compiled by the Bureau of the Census, provide some indicators of educational attainment for Utah and the nation. Exhibit 35 shows a comparison of the findings of the 1970 census, the 1976 Survey of Income and Education, and the 1980 Census. In both 1970 and 1976, Utah was ranked first among the fifty states in the percentage of its population over 25 holding a high school diploma. In 1980 Utah was second-ranked among all fifty states, being surpassed only by Alaska. The percentage of adults holding a high school diploma rose steadily within the state over the decade with 80% holding at least a high school diploma in 1980, as compared to 67.3% in 1970.

Exhibit 35 displays the median years of education for the same three census studies mentioned above. This analysis shows Utah ranked first among the fifty states at all three points in time. The median years of education for Utah adults increased from 12.5 to 12.8 during the decade, while the national median increased from 12.2 to 12.5. These census-based indicators continue to demonstrate that the state of Utah provides a very large percentage of its population with the opportunity to complete secondary education and pursue postsecondary education.

The 1980 Census also provides some insight into the amount of college which is completed by the adult population. For example, 44.1% of Utah adults have completed between one and three years of college. This ranks the state of Utah first in this category, as the national average for 1980 was 31.9%. The state also does rather well in the percentage of its adult population completing four or more years of college. Utah had 19.9% of its adult population complete at least this much college. This ranked the state eighth in the nation and compared to a national percentage of 16.2%.

EXHIBIT 35

Utah versus National Adult Educational Attainment for 1970, 1976, and 1980

A. Percentage of population over 25 with a high school diploma.*

1970			1976			1980		
Utah Percentage	Utah's Rank in Nation	National Percentage	Utah Percentage	Utah's Rank in Nation	National Percentage	Utah Percentage	Utah's Rank in Nation	National Percentage
67.3%	1st	52.3%	78.9%	1st	63.8%	80.0%	2nd	66.3%

B. Median years of education

1970			1976			1980		
Utah	Utah's Rank in Nation	National	Utah	Utah's Rank in Nation	National	Utah	Utah's Rank in Nation	National
12.5	1st	12.2	12.8	1st	12.5	12.8	1st	12.5

*Includes all those who are high school graduates, as well as those who are college graduates or have some college

Sources: 1970 United States Census
1976 Survey of Income and Education
1980 United States Census

VIII. COURSES TAKEN BY SENIOR HIGH SCHOOL STUDENTS

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COURSES TAKEN BY UTAH SENIOR HIGH SCHOOL STUDENTS

Since 1984, the Utah State Office of Education has collected information on the course-taking patterns of high school seniors across the state. This has been accomplished through the state's annual survey of the Intentions and Accomplishments of Utah High School Seniors. The following results document the course-taking patterns of Utah high school seniors in the graduating classes of 1984 through 1988. In any given year, this survey is completed by approximately 80% of a particular graduating class. In 1988, the survey was completed by 17,337 Utah high school seniors.

Profile of the Grade 10 - 12 Programs of Utah High School Seniors - Exhibit 36. Exhibit 36 presents a profile of the percentages of Utah high school seniors taking at least two years and at least three years of course work in each of eight major subject areas. The 1988 results suggest a continuation of the trends in course-taking of Utah seniors which had been noted in the four previous years. All subject areas showed at least slight increases in the percentage of students taking at least two years of each subject. Of particular note here were science and art, each of which showed a 10% increase in the number of students taking at least two years. More stability was noted in the results for students taking at least three years of each subject. Here again, slight increases were noted for every subject area except foreign language and mathematics which held stable.

In contrasting the 1988 results with those from 1984, five subject areas have demonstrated rather marked increases over this five-year period. These areas are: foreign language, history and social studies, mathematics, science, and art. English, music, and physical education show rather stable

EXHIBIT 36

Profile of the Grade 10-12 Programs of Utah High School Seniors, 1984-88

Subject Area	Percentage of Utah High School Seniors Who Have Taken at Least:									
	Two Years of Subject					Three Years of Subject				
	1984	1985	1986	1987	1988	1984	1985	1986	1987	1988
English or Literature	94.7%	93.9%	94.9%	94.5%	97.3%	79.6%	78.0%	79.1%	79.3%	80.5%
Foreign Language	11.6%	17.1%	27.2%	37.9%	39.0%	4.0%	4.9%	6.7%	8.0%	8.0%
History/Social Studies	83.2%	82.2%	82.6%	87.5%	90.3%	24.7%	26.6%	28.8%	33.4%	34.1%
Mathematics	65.7%	72.9%	77.3%	78.1%	81.5%	27.7%	32.1%	34.5%	34.8%	34.8%
Science	47.8%	54.2%	59.4%	61.3%	71.5%	15.0%	17.7%	20.0%	20.2%	22.4%
Art	13.5%	13.8%	15.3%	19.3%	31.6%	5.2%	5.6%	6.5%	8.4%	12.5%
Music	20.5%	19.8%	19.6%	20.2%	22.2%	12.6%	11.9%	11.6%	11.9%	13.2%
Physical Education	59.9%	58.7%	59.0%	59.6%	60.9%	30.5%	29.4%	28.5%	29.8%	29.3%

Source: Survey of the Intentions and Accomplishments of Utah High School Seniors, 1984-88.

enrollments over this same period of time. The most profound increases in enrollment are for foreign language, mathematics, and science. In each of these subject areas, substantially higher percentages of students had taken at least two years of course work as of 1988 than was true for the graduating class of 1984.

Specific Courses Taken by Utah High School Seniors - Exhibit 37. Exhibit 37 profiles the percentages of Utah high school seniors who have taken selected, specific courses. In general, the enrollment of Utah high school students in courses in the typical math sequence has risen between 1984 and 1988. This trend is particularly strong for the algebra II and geometry courses which have experienced increases ranging from 15% to 18% over the five years between 1984 and 1988. The percentage of Utah seniors who have taken physics and chemistry has also risen to a modest extent since 1984. A substantial increase of over 15% was noted for the students enrolled in a computer science course.

Through 1988 rather steady growth was apparent in all of the honors/ advanced placement courses listed in Exhibit 37. It is apparent that much higher percentages of Utah students are opting for these courses with more rigorous content in 1988 than was true four years earlier. This finding mirrors the most recent information from the College Board's Advanced Placement program in which almost 9,000 Advanced Placement exams were taken by Utah high school students during 1988.

An analysis of the course-taking patterns of male and female students in the class of 1988 shows that male graduates continue to take more courses in mathematics, science, and physical education than do female students. Specifically, 40% of the male students in the graduating class of 1988 took

EXHIBIT 37

Percentage of Utah High School Seniors Who Have Taken Selected Specific Courses, 1984-88

Course	Percentage of Seniors Who Have Taken Course:				
	1984	1985	1986	1987	1988
Algebra I	78.7%	83.4%	86.4%	87.8%	88.4%
Algebra II	48.2%	54.6%	60.6%	61.9%	63.2%
Geometry	48.3%	54.7%	61.2%	64.6%	66.4%
Trigonometry	24.7%	29.4%	31.5%	31.9%	33.0%
Calculus	8.4%	10.4%	11.2%	11.0%	11.2%
Applied Math	27.8%	27.3%	25.8%	25.2%	26.8%
Physics	14.2%	17.0%	17.2%	16.4%	18.8%
Chemistry	26.7%	30.5%	33.2%	33.6%	38.0%
Applied Science	32.0%	34.6%	32.7%	33.9%	35.9%
Computer Science	28.0%	35.1%	38.1%	36.9%	43.4%
Honors/AP History	15.6%	17.1%	18.7%	19.2%	20.8%
Honors/AP English	21.0%	25.1%	26.5%	26.6%	27.6%
Honors/AP Math	10.1%	11.6%	12.7%	12.1%	13.1%
Honors/AP Biology	7.5%	7.5%	9.0%	9.2%	10.5%
Honors/AP Chemistry	3.3%	4.4%	5.4%	4.8%	5.3%

Source: Survey of the Intentions and Accomplishments of Utah High School Seniors, 1984-88

at least three years of mathematics. This same level of preparation was obtained by only 29% of the females. In science, 26% of the males had at least three years of course work, while just under 19% of the females took three courses in science.

In analyzing specific courses, higher percentages of males reported taking courses in the entire college preparatory math sequence with the exception of algebra I. In the area of science, over 25% of the males in the graduating class of 1988 had taken physics, while only 12% of the females had completed this course. Nearly 41% of the males had taken a course in chemistry, while 35% of the females had completed this course. Another area of substantial difference was computer science where nearly 50% of the males had completed a course contrasted with just 37% of females.

An overview of these results indicates that the state and district graduation requirements which were put into place during 1983 and 1984, along with heightened college entrance requirements, have had a substantial influence on the course-taking patterns of Utah students over the last five years. The curriculum areas which continue to show at least modest, and in some cases substantial, growing enrollment are foreign language, history and social studies, mathematics, science, and art.

IX. THE NATIONAL AND INTERNATIONAL PICTURE— NATIONAL ASSESSMENT AND INTERNATIONAL EVALUATION STUDY FINDINGS

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THE NATIONAL AND INTERNATIONAL PICTURE: NATIONAL ASSESSMENT AND INTERNATIONAL EVALUATION STUDY FINDINGS

The National Assessment of Educational Progress (NAEP)

The National Assessment of Educational Progress has, since 1969, gathered educational achievement information describing the performance of students across the nation who were ages nine, thirteen, and seventeen, as well as young adults. Assessment has taken place in virtually every curriculum area including art, career and occupational development, citizenship, literature, mathematics, music, reading, science, social studies, writing, and computer competence. This effort, which produces a truly representative national profile of achievement in key areas, is unique in the history of educational testing in this country or any other. The results produced provide an extremely helpful picture of national trends in key achievement areas. The following sections present an overview of important results from NAEP assessments.

National Performance Trends

Reading. NAEP has assessed reading five times during the last fifteen years (1971, 1975, 1980, 1984 and 1986)[1]. During this period of time the following general trends have emerged from analysis of National Assessment reading achievement information (NAEP, 1985):

- Students at ages nine, thirteen, and seventeen were better readers in 1984 than students at the same ages were in 1971. Nine and thirteen-year-olds improved through the 1970's and seventeen-year-olds improved between 1980 and 1984. The recent improvements by seventeen-year-olds may in part reflect earlier improvements at ages nine and thirteen.

- Black and Hispanic students, as well as those living in disadvantaged communities, have made sizeable improvements.

[1] NAEP 1986 Reading results are still being interpreted.

- Virtually all thirteen and seventeen-year-olds can read basic material, and 84% of the seventeen-year-olds still in school have acquired the intermediate reading skills and strategies necessary to understand specific and general information in relatively lengthy reading passages.

- Nine and thirteen-year-olds did not show improvements between 1980 and 1984, halting the upward trend in performance at these ages during the 1970's.

- The marked improvement in the achievement of minority and disadvantaged urban students between 1971 and 1984 has reduced the gap between their performance and that of other students. Still, the average reading proficiency of these students is quite low and in need of further improvement. For example, the average reading proficiency of black and Hispanic seventeen-year-olds is only slightly higher than that of white thirteen-year-olds.

- Six percent of nine-year-olds in 1984 could not do rudimentary exercises and are in danger of future school failure. Forty percent of thirteen-year-olds and 16% of seventeen-year-olds attending high school have not acquired intermediate reading skills and strategies, raising the question of how well these students can read the range of academic material they are likely to encounter in school. Few students, only about 5%, even at age seventeen, have advanced reading skills and strategies. [pg. 6 & 7]

Mathematics. Mathematics has been assessed four times during the last fifteen years (1973, 1978, 1982, and 1986). Between 1973 and 1986 the performance of nine-year-olds and thirteen-year-olds improved for both the total national samples as well as virtually every sub-classification including all ethnic groups and students at all levels of ability. Performance of seventeen-year-olds, on the other hand, declined a very slight amount during this same period as did the overall performance of whites and students in the mid and high ability ranges. The following generalizations are drawn in NAEP's 1988 report on mathematics:

> Recent national trends in mathematics performance are somewhat encouraging, particularly for students at ages nine and seventeen. Sub-populations of students who performed comparatively poorly in past assessments have shown significant improvement in average proficiency since 1978. At all three ages, black and Hispanic students made appreciable gains, as did students living in the southeast.

> While average performance has improved since 1978, the gains have been primarily to lower order skills. The highest level of performance attained by any substantial proportion of students in 1986 reflects only moderately complex skills and understandings. Most students, even at age 17, do not possess the breadth and depth of mathematics proficiency needed for advanced study in secondary school mathematics.
>
> While we may be recovering from the doldrums of poor performance that characterized the 1970's, it is crucial that we do even better to reach expected or hoped-for levels of achievement. Improvements are needed, not only in average proficiency, but also in the number of students who reach the upper levels of performance. [pg. 9 and 10]

Science. Science has been assessed five times since the establishment of NAEP (1970, 1973, 1977, 1982, and 1986). Slight downward trends were noted between the first and second assessments of science (1970 and 1973). Only the seventeen-year-olds showed a decline between the second and third assessment (1977), while the overall performance of the nine-year-old and thirteen-year-old groups was rather constant between the second and third assessments. Both nine-year-olds and thirteen-year-olds improved between the fourth and fifth assessments as did the seventeen-year-old group. NAEP's (1988) recent report on science achievement states the following conclusions:

> Considering the dismal impressions that have been conveyed about science achievement in our country, particularly compared with other countries, the NAEP data indicates some hope for future improvements in science education. The pervasive declines posted in the early 1970's seem to have abated and students at all three ages have shown recent improvements, the most substantial of these being the upturn shown by seventeen-year-olds after more than a decade of steady declines. At ages nine and thirteen, the patterns of decline have been less pronounced and recovery more complete.
>
> These recent NAEP science trends reinforce an increasing body of information suggesting educational recovery in our country. Recent results from a number of large-scale surveys, including the NAEP trends in mathematics and writing, and the modest upturn in mathematics SAT scores, indicate that national declines in student test scores may be subsiding and we may be experiencing the beginning of a positive trend back to or even beyond previous achievement levels. [pg. 25 and 26]

Social Studies. NAEP has conducted two assessments of social studies (1972 and 1976). The period between these two studies saw no change in the total performance of the nine-year-old group, while the performance of thirteen-year-olds declined very slightly, and seventeen-year-old performance declined to a somewhat greater degree. In all three age groups, items measuring political knowledge declined between the two assessments. Martin (1981) illustrates some of the social studies findings from the two assessments:

> While nearly all the students in both assessments could name the President of the United States, in the second assessment slightly less than one-half of the seventeen-year-olds could name either their congressperson or one of their senators, a decline of nine percentage points from 1969. About one-fifth of the thirteen-year-olds in either assessment could successfully identify one of their representatives from either the U.S. House of Representatives or the U.S. Senate. In the second assessment, 64% of the thirteen-year-olds and 81% of the seventeen-year-olds knew a senator was elected to office. [pg. 3]

Writing. The NAEP writing assessments have been conducted at four points including 1970, 1974, 1979, and 1984. Interestingly, the National Assessment results from the first three studies revealed no major changes in the writing abilities of students during the 1970's. Martin (1981) offers the following analysis:

> The majority of students at age nine, thirteen, and seventeen demonstrated control over the basic conventions of writing. However, a sizeable minority (from 10% to 25%) at each age appeared to have very serious problems with writing; their papers contained two to three times as many errors as the average paper written by students their age. [pg. 1]

The seventeen-year-old group wrote in a more coherent fashion in 1979 than they did in 1970. This high school group used more transitions in their stories, and produced more coherent paragraphs in descriptive essays than their counterparts a decade earlier.

Appleby, Langer, and Mullis (1986) have analyzed the most recent information available from NAEP's writing assessments in their work describing writing performance between 1974 and 1984. These authors come to the following conclusion which characterizes the most recent ten-year period of NAEP writing assessment:

> Despite erratic changes from 1974 to 1984, the writing proficiency of the nation's students, on balance, showed mixed trends or declined during the first five years and then recovered during the second half of the decade. The pattern of some decline in the late 1970's, as well as the subsequent recovery in the early 1980's was clearest for the thirteen and seventeen-year-olds; trends in performance at age nine have been less consistent, with declines in performance on some items offset by improvements on others. While undramatic, the national trend in writing proficiency in the second half of the decade (1979-84) has been generally positive. Students in all age groups did better on most writing tasks in the 1984 assessment: the major exception was a significant decrease on the persuasive writing task at age nine. [pg. 60]

Martin offers some insight into why writing may not be stressed (as much as would be desirable) in the schools with the following observation:

> Writing instruction continues to be considered the responsibility only of English teachers instead of an activity that pervades the entire curriculum. Additionally, many teachers deprive students of writing opportunities by relying on multiple-choice, true-false, or short-answer tests and shying away from essay tests. Many people teaching English were trained in other subjects and know little about teaching writing; many teachers trained to teach English have had little training in composition or writing; and many English teachers perceive themselves as "literature teachers," not writing teachers, and focus on the products of writing instead of the process. Finally, fewer writing assignments are given because of the time required to read and critique such assignments and many teachers feel -- justifiably in most cases -- that they do not have the time required. Yet writing is a skill that requires practice. [pg. 1]

The Arts. Both the visual arts and music were assessed twice during the decade of the 1970's. Results from the assessments of visual art showed that the performance of nine-year-olds remained essentially stable between 1975 and 1979, while that of the thirteen and seventeen-year-old age groups declined slightly in this same period. The decreases were largely attributed

to declines in students' "valuing" of art and the importance they placed upon art, as well as their willingness to accept all kinds of art, not just the traditional art forms. NAEP (1982) has the following summary in respect to art education:

> While the primary focus of art education at all levels in schooling is on providing art-making experiences, the NAEP art experts concluded that on design and drawing tasks measured by National Assessment, "the majority of students do not appear to design or draw particularly well." Improvements in performance with age and number of art classes taken indicate that design and drawing skills can be taught and are not solely the function of a youngster's innate creativity. [pg. 2]

The two assessments of music (1972 and 1979) showed that, in general, American students have positive attitudes about music and many have actually performed in school music groups. On the other hand, the music knowledge of both the nine and seventeen-year-old age groups declined between the two assessment periods, while that of the thirteen-year-old age group remained constant. The national declines were attributed to diminishing knowledge about the elements of music and how such elements are represented symbolically. The area of knowledge of music styles and history remained essentially stable between the two assessments. NAEP (1982) offers some suggestions as to why the results in music emerge as they do:

> Members of the (NAEP) music interpretative panel attributed the lack of growth on items about musical elements and symbols to the fact that general music classes, where these concepts are usually taught, are often required courses for middle or junior high students but either are not available or not required for senior high school students. Students may learn about music history and music styles by listening to music or through classes other than music classes, panel members agreed. Not particularly alarmed by the relatively low percentages able to classify music by historical period, the panel pointed out that very few high schools offer the kinds of music history courses that would equip students to answer these questions. [pg. 3]

The NAEP Analysis of Literacy in America. In 1985, NAEP mounted a major study of the literacy skills of a nationally representative sample of 21 to

25-year-old adults (Kirsch and Jungeblut, 1986). This study rejected the unitary definition of literacy, which is often sought, in favor of a more encompassing definition. The NAEP approach to measuring literacy included three major skills. These were: reading and interpreting prose, identifying and using information, and applying numerical operations. NAEP's overall definition of literacy was the following: "Using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential." Among this study's major conclusions were the following:

> It is clear from these data that "illiteracy" is not a major problem for this population. It is also clear, however, that "literacy" is a problem. Sizeable numbers of individuals are estimated to perform within the middle range on each of the scales. Within these broad ranges, individuals are neither totally "illiterate" nor fully "literate" for a technologically advanced society.
>
> The overwhelming majority of America's young adults are able to use printed information to accomplish many tasks that are either routine or uncomplicated. It is distressing, however, that relatively small proportions of young adults are estimated to be proficient at levels characterized by the more moderate or relatively complex tasks. It has been argued that many, if not most, of society's managerial, professional, and technical service sector jobs will require participation in some post-secondary program. This argument raises the question of whether or not individuals with more limited literacy skills will qualify for or benefit from such education and training programs. [pg. 5 & 6]

Computer Competence. The National Assessment of Educational Progress conducted its initial assessment in the area of computer competence in 1986. This assessment was far-ranging in examining both the specific skills of students at various grade levels, as well as looking at opportunities to learn the nature of computer learning resources. The following were among the key findings from this initial assessment of computer competence:

- Students generally had difficulty answering questions on the assessment, especially questions about computer applications and programing.

- The experiences of having used a computer or studying computers in school, and of having access to a computer a home are positively related to computer competence.

- Most students like using computers and want greater access to them.

- Much learning about computers takes place outside of school and independent of formal instruction. Across demographic sub-groups, the increased competence associated with having a computer at home is comparable to the advantage linked to studying and using computers at school. Students who study computers at school and have access to a computer at home are the most competent.

- Computers are seldom used in subject areas such as reading, math, or science. Rather, the use of computers in schools is largely confined to computing classes. [pg. 5 & 6]

International Studies in Educational Achievement: Academic Performance of Students in the United States and Other Countries

One of the most ambitious studies of academic achievement ever attempted was the initial effort to study the characteristics of education around the world called the "International Studies in the Evaluation of Educational Achievement." The initial studies in this program were accomplished in the 1960's and 1970's. Although the number of countries participating varied by the topic of the inquiry, fifteen or more countries participated in every major aspect of the study. The great majority of these countries were the highly developed and urbanized countries of Europe; however, the study also included the United States, Japan, Israel, Chili, India, Iran, and Thailand.

One of the important insights furnished by this massive initial effort was the clear demonstration that the United States, perhaps more than any other country, has an education system which reaches virtually all its young people. This is in marked contrast to the majority of other countries studied where diminishingly small percentages of students remain in the educational system past the age of fourteen. Tyler (1981) makes the point very graphically:

> At the time of the cross-national testing program, the U.S. retained 78% of the age group through the final year of secondary school, while Japan retained 70%, Sweden 65%, Australia 29%, Hungary 28%, England 20%, Scotland 17%, New Zealand 13%, The Netherlands 13%, and Germany 8%. [pg. 308]

The above illustrates the massive experiment in educational opportunity for all which has characterized education in the United States and sets the U.S. system apart from the "education for the elite" approaches of many countries.

Summary of Key Findings From the International Achievement Studies

One of the most interesting findings of the International Evaluation effort pertained to a special group of students consisting of the top 5% academically of each participating country. In respect to this group, Tyler offers the following conclusion: ". . . the top 5% of U.S. young people attain the same high scores reached in nations where advanced schooling is reserved for an elite." [pg. 307]

Perhaps the most fair comparison across countries was obtained by an examination of students in the study's fourteen-year-old group. Typically, children of that age are still in school in most modern nations. Thus, results from that group give a reasonable approximation of performance for any developed country. Two of the key curriculum areas in the International Studies were reading comprehension and science. For the fourteen-year-old group mentioned above, the United States ranked third among the fifteen nations tested in reading comprehension. Only Japan and Italy had higher scores on reading comprehension for students at this level. Another key curriculum area, science, showed a rather similar pattern for fourteen-year-olds. Here, the United States was fourth among sixteen nations tested. U.S. scores were lower than those of Japan, Hungary, and West Germany.

In mathematics, results from the First International Evaluation Study showed that while children from nearly all developed nations had mastered the basic operations by age fourteen, only Japanese children were highly skillful in dealing with the application of computational skills to real world problems. As in other curriculum areas, the top 5% of U.S. high school seniors performed extremely well compared to the other countries in mathematics. However, the average math score for the American high school seniors tested was the lowest among the nations included in this part of the study. This fact appears highly related to the low selectivity of the American high school with over 78% of those beginning school in the United States still in school as seniors. Still, it must be noted that the Japanese, who retain 70% of their students through high school graduation, performed rather well in mathematics.

The Second International Study of Mathematics Performance took place in 1981 and 1982. Some of the key findings dealing with mathematics achievement were the following:

- United States students (in grade 8) were slightly above the international average in computational arithmetic (calculation) and well below the international average in non-computational arithmetic (e.g. problem solving).
- By the end of eighth grade, U.S. achievement in algebra was comparable to the international average.
- U.S. achievement in geometry ranked in the bottom 25% of all countries, reflecting to a large extent low coverage through the end of the eighth grade.
- Achievement on the statistics items of the international test was at about the international average.
- The achievement (of twelfth grade students) of the calculus classes which were the nation's best mathematics students, was at or near the average achievement of the groups of senior secondary school mathematics students in other countries.

> The U.S. pre-calculus students (the majority of twelfth grade mathematics students) achieved at a level which was substantially below the international mean scores for all countries in the study and in some cases were ranked with the lower one-fourth internationally. [pg. viii & ix]

During the period from 1983 through 1986, the International Association for the Evaluation of Educational Achievement conducted a second International study of science performance. The study featured an examination of students at three levels: Ten-year-olds, fourteen-year-olds, and students in their final year of secondary school -- typically grade twelve. The report summarizes the achievement at these three levels in science for the United States as follows:

> The United States of America tries to retain young people in elementary and secondary school. Representative samples of these young people have a middle position in science achievement in grade five and a lower position in grade nine. The achievement of advanced science students in biology, chemistry, and physics is low. The biology results are especially low. For a technologically advanced country, it would appear that a re-examination of how science is presented and studied is required. [pg. 8 & 9]

A New Study From Educational Testing Service - An International Assessment of Mathematics and Science

Recently the Educational Testing Service (Lapointe, Mead, and Phillips, 1989) employed methodology which had its origin in the National Assessment of Educational Progress to conduct a multi-national study of the mathematics and science performance of thirteen-year-olds. The study included several Canadian provinces as well as Ireland, Korea, Spain, the United Kingdom, and the United States of America. The assessment was completed during early 1988. The study draws the following conclusions from analysis of the mathematics performance of the United States sample:

> Mathematics. The position of the United States as last in overall achievement heightens concern for the future of an increasingly competitive world. . . while it is satisfying to see that close to 100% of our students from all segments of our society (have) a

mastery of the basics, the fact that only 40% of them are able to solve two-step problems is a matter for grave concern.

Comparisons with the more successful competitors suggest examining impact of heavy television watching by students and the small amount of mathematics homework typically done. The importance attached to mathematics by schools and society in general also may be a factor. [pg. 79]

In respect to the area of science, the report draws similar conclusions:

Science. The United States has traditionally thought of itself as technologically innovative and in the forefront of science. These results are sobering and pose a serious challenge to our position in the world community. It is satisfying to observe that almost all of our thirteen-year-olds, including those from the most economically disadvantaged sectors of our society, know every day science facts. Nevertheless, that only 42% of them can use scientific procedures and analyze scientific data is clearly unacceptable. [pg. 79]

These new findings from the ETS International Assessment of Mathematics and Science largely confirm previous efforts in international assessment of achievement. One fascinating aspect of this recent study is the effort to profile both results and educationally relevant characteristics of each of the countries and provinces studied. This is a helpful contribution and should allow mathematics and science educators in all participating countries to gain better insights into the factors which are critical for enhancing performance.

X. SUMMARY AND CONCLUSIONS

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SUMMARY AND CONCLUSIONS

This chapter presents an overview of the findings presented in the 1989 edition of Utah Educational Quality Indicators. Instead of recapitulating the results already presented for each information source, the focus will be on examining several major areas of performance and relating appropriate sources of information to these major areas. This summary has five major sections. The first section is Academic Achievement which covers mathematics, reading/language arts, science, social studies, and art and music achievement. The second major section is Student Characteristics which deals with information in areas such as academic self-concept, peer relations, and career development. A third section summarizes pertinent information about Patterns of Course Taking in Utah schools as well as students' evaluations of their educational experience. A fourth section highlights implications for Educational Reform, and a final section will endeavor to highlight implications for education in the 1990's and beyond.

Academic Achievement

Mathematics. As is true with most of the traditional, academic areas which will be reviewed here, distinct differences have been noted in both state and national results in mathematics based on the level of skills being assessed. Utah's Statewide Educational Assessment results have shown a distinctly positive picture at both grade five and grade eleven in describing the basic skills achievement of Utah students. Mathematics performance of both fifth and eleventh graders on the Comprehensive Tests of Basic Skills was significantly higher in 1987 than it was ten years earlier and substantially above national norms.

Results from a variety of programs including State Assessment, National Assessment, and the ACT, suggest that typical students in Utah, as well as students nationally, do not demonstrate the same level of competence in intermediate and higher-level math skills (such as algebra and geometry) which is evident in the basic skills areas of mathematics. Another troublesome finding is the fact that Utah males continue to score at much higher levels than females on the ACT mathematics test. Recent analyses of course-taking of Utah senior high students have found lower percentages of Utah's young women electing into courses such as second-year algebra and trigonometry. While this does appear to be changing slowly, there is still significant room for improvement.

To review, the performance picture in mathematics is rather positive when considering basic mathematics skills of both elementary and secondary students. The state's most gifted students perform very well in higher level mathematics. This group performs consistently better than the national comparison group in programs such as Advanced Placement. Conversely, there is considerable evidence that intermediate and higher level mathematics skills are not being acquired to a sufficient degree by typical secondary students in Utah and across the nation. This problem continues to demand serious attention from educators and the public.

Reading/Language Arts. The 1987 Statewide Assessment revealed that scores of Utah fifth and eleventh grade students were much higher than those of the national norm group on the Comprehensive Tests of Basic Skills in reading. This held true for both vocabulary and reading comprehension. An earlier disconcerting finding was a decline between 1981 and 1984 in the performance of Utah eleventh graders on this test. Eleventh grade reading performance did, however, return to a very acceptable level in the 1987 assessment.

The national picture, as documented by evidence from the National Assessment of Educational Progress, suggests that students across the nation have mastered the basics in reading to a very significant degree. Concern again emerges in examining higher-level skills in reading. The 1984 National Assessment of reading showed that 40% of thirteen-year-olds and 16% of seventeen-year-olds did not have intermediate reading skills and strategies, and fewer than 5% of the seventeen-year-olds had acquired advanced reading skills and strategies.

In the area of English usage, 1987 results from the Statewide Educational Assessment showed Utah fifth and eleventh graders performing at substantially higher levels than national norm groups on the Comprehensive Tests of Basic Skills language usage test. State and national ACT results in English have taken a rather marked upswing beginning with 1984. Utah's average ACT English score in 1988 was, in fact, the highest average obtained by Utah students on this test during a twenty-two year period beginning in 1967.

Results from the Advanced Placement program in English show consistent increases in Utah performance over a twenty-year period. During this same time the scores of national AP English test-takers have remained very stable. Utah AP students in English have in recent years, performed at higher levels than the national group.

While writing has not been directly assessed as part of any statewide study in Utah, the results from national studies, such as the National Assessment of Educational Progress, would indicate that a serious look should be taken at the need to enhance writing instruction. Greater focus would appear to be needed on the structural elements of writing, and students need many more opportunities to produce compositions and receive informed criticism of their work.

The total picture in reading and the other language arts suggests strongly that Utah elementary and secondary students perform very well in the basic skills. Very high percentages of Utah adults can deal with the everyday reading skills necessary to function in society. Considerable national evidence suggests that more emphasis should be placed on helping students acquire advanced skills in both reading comprehension and the use of the English language with particular emphasis on writing skills.

Science. Evidence from virtually every source reviewed in this report suggests that Utah students perform very well in the various areas of science. The first Statewide Assessment showed that Utah fifth and eleventh grade students scored at dramatically higher levels than national norm groups on the science test of the Comprehensive Tests of Basic Skills. This same level of superiority is reflected in the performance of Utah high school students on the ACT science test, where the Utah students tested out-perform the national comparison group over a long period. Utah ACT science scores are, in 1988, at a twenty-two year high.

The national picture, as documented by the National Assessment of Educational Progress (NAEP), was not as bright up through the 1982 study. The most recent National Assessment in 1986 did show improvement in the performance of students in every age group, with seventeen-year-olds making the greatest gains. This comes on the heals of more than a decade of steady declines. Hopefully, the 1986 results mark the beginning of substantial improvements in national science performance.

Utah's academically gifted students have shown a very significant trend of growth in their Advanced Placement scores in biology over a twenty-year period. On the AP chemistry test, Utah students have performed at levels essentially equal to the national comparison group over the last several years.

Overall, science continues to be an area of considerable strength for Utah students at both the elementary and secondary levels. Efforts should be made to sustain and build on this record and to continue to attract and keep the best available science teachers.

Social Studies. Through 1983, there was great similarity in the performance of Utah high school students and the national sample on the American College Testing program social studies test. In 1984, there was a marked departure from this similarity with Utah students scoring half a standard scale point higher than the previous year, and almost half a point higher than the national comparison group. The 1988 ACT results continue to show Utah students scoring higher than the national comparison group.

National Assessment has measured knowledge, skills, and attitudes in social studies twice. These studies demonstrated very little change in the overall performance of the nation's nine-year-olds with slight declines at the thirteen-year-old level and larger declines for seventeen-year-olds. These results were observed in the mid 1970's.

The American History test in the Advanced Placement program shows a substantial increase in the performance of Utah's academically gifted students since the early 1970's. The most recent AP American History results show a slightly higher percentage of Utah students qualifying than is the case for the more select national group on this test.

Art and Music Achievement. Results from the first three assessments of music achievement in the Statewide Educational Assessment program showed consistent growth for Utah fifth graders between 1975 and 1981. The scores of Utah eleventh graders were also higher in each of the first three assessments. Positive changes were also noted at both grade levels for art achievement between 1978 and 1981. The most recent Statewide Assessment in

1987, however, using a small sampling of art and music achievement items, showed performance decreases in both art and music achievement at both grades compared to previous levels of performance. This most recent trend, as well as the absolute levels of performance in both art and music, clearly indicate an opportunity for improvement in these areas. Much the same finding was documented by National Assessment results in art and music, which were not as positive as the Utah profile.

Student Characteristics

This section will feature a summary of findings dealing with certain critical student characteristics other than the academic achievement areas which have just been summarized.

Academic Self-Concept. The Utah Statewide Assessment program has gauged the level of student academic self-concept in all five assessments between 1975 and 1987. For the most recent assessment, student scores for academic self-concept improved significantly at grade eleven and were stable at grade five. Students with high scores on academic self-concept tend to have high scores on other educational outcome measures. Student academic self-concept is apparently bolstered by teaching practices such as reinforcement of self-concept.

Peer Relations. The profile of results on the peer relations measure from the Statewide Assessment program shows consistent growth over an extended period for Utah fifth graders with a ten-year high reached in 1984. The 1987 fifth grade results were slightly lower. Eleventh grade scores reached a twelve-year high in the 1987 assessment. Students with high scores on the peer relations measure tended to have higher scores on many other important student characteristics as well.

Career Development and Career Awareness. The Statewide Assessment program measures several different aspects of student career development and awareness. These include scales measuring career development experience, career awareness and exploration, as well as independent development. The career development experience scale measures the participation of Utah eleventh graders in school-based career education activities. This scale shows very little change over a twelve-year period for Utah eleventh graders. The fact that about one-third of the students tested reported no exposure to career development experiences is a definite cause for concern.

Results from the career awareness and exploration scale, which focuses on the extent to which students have considered personal career plans and activities, shows a positive trend from 1975 through 1981, but a moderate decline in 1984. The 1987 results were at exactly the same level as 1984. Clearly, there is still considerable room for greater implementation of such career education thrusts as student use of career resource centers, work observation, career-focused parent involvement, and student educational planning.

Educational Aspirations. The pattern of educational degree aspirations of Utah college-bound students is somewhat different than the national ACT sample. Historically, Utah students have tended to be somewhat more interested in pursuing graduate level degrees than the national sample and less interested in a terminal Bachelor's degree program. This inclination is well reflected in U.S. Census data which shows that adult Utahns have more years of education than the citizens of any other state.

Patterns of Course Taking and Student Evaluations of Their Educational Experience

In a 1984 modification of the annual Survey of Intentions and Accomplishments of Utah High School Seniors, the State Office of Education has developed the capability of tracking student-reported experiences in selection of courses. Results are now available for 1984 through 1988. In contrasting the 1988 results with those from 1984, five subject areas have demonstrated rather marked increases over this five-year period. These areas are: foreign language, history and social studies, mathematics, science, and art. English, music, and physical education show rather stable enrollments over this same period of time. The most profound increases in enrollment are for foreign language, mathematics, and science. In each of these subject areas, substantially higher percentages of students have taken at least two years of course work as of 1988 than was true for the graduating class of 1984. Yet another area where definite positive trends have been noted is in the honors and Advanced Placement courses where higher percentages of 1988 seniors reported taking classes in areas such as history, English, mathematics, biology, and chemistry than was true for 1984 seniors.

Student Attitude Toward School and Evaluations of Schooling. Results from the Statewide Assessment program over the first four assessments showed increasing levels of student enjoyment of school at both grade five and grade eleven. The 1987 results for this scale showed decreased enjoyment of school for both grades. This most recent finding merits close attention.

The Utah 1988 ACT college-bound sample of students evaluated the overall adequacy of their high school education in a considerably more positive fashion than did the national ACT sample. A higher percentage of Utah students rated their high school experience as either "excellent" or "good"

than did the national group. This observation was true across secondary preparation areas including business, vocational, college preparation, or students in a general curriculum.

Implications For Educational Reform

While the impact of much of what has been put into place under the umbrella of educational reform must be assessed over a much longer period of time and with more targeted evaluation strategies than the system-wide emphasis which is provided here, there are some important observations which do stem from the information in Quality Indicators.

First, the rather pronounced increases in the performance of Utah high school students on the ACT science and English tests is an important finding. It is highly probable that these performance increases are, in part, linked to more rigorous requirements for graduation which have been established at both the state and local levels in Utah, as well as to the higher college entrance admission standards which have been put in place by several colleges and universities in the state. Thus, in at least two curriculum areas, higher expectations do appear to be translated into performance increases at both the state and national levels.

Second, a related finding is that Utah high school students are enrolling in greater numbers, than was true previously, in subjects such as intermediate and higher level mathematics, science, and foreign language. There would again appear to be direct linkages between this finding and the higher requirements which have been set for students in the form of new graduation requirements and college admissions standards.

Third, the dramatic increase in the number of Utah students participating in the Advanced Placement program as well as the very substantial performance of the Utah students engaging in this effort is a significant finding.

Literally thousands of Utah students are now earning college credit for courses taken in high school and at the same time receiving extremely high quality instruction as a direct result of the Advanced Placement program. This is an example of the finest expression of educational productivity which spans the public and higher education sectors.

As indicated above, many of the aspects of educational reform must be examined in a much more targeted fashion than is possible here. In the next several years the impact of programs such as Utah's career ladder effort, additional efforts at curriculum reform, with the full scale implementation of the K-12 core curriculum, and efforts such as more emphasis on student educational planning all have the potential for influencing many of the performance indicators which are reviewed in the Quality Indicators series. Thus, some aspects of the reform movement have already made measurable differences in the performance of Utah students, while others will, by their very nature have to be in place and fully operational for a period of time before they can reasonably expect to impact the performance of students on measures like those reviewed here.

Implications For Education in the 1990's and Beyond

Preparing for the "Information Society." Recently the Education Commission of the States addressed the matter of how well the schools of the nation are preparing students for the so-called "information society." Certainly the decade of the 1990's will be characterized by an increasing focus on information and information technology. A key issue is whether or not our present educational delivery system is responsive to changes currently impacting it and how will it accommodate to the pressures of tomorrow. The Education Commission of the States summarized its examination of these matters with the following statement:

The United States has entered the age of rapid information transmission. Breakthroughs in electronics and communication technology are responsible for this transformation and permit unprecedented industrial restructuring. Structural changes in the labor force characterize an expanding economy, however, and need not threaten economic stability. Thus, by examining the skills needed in tomorrow's labor force, we can better prepare workers for the changing conditions they will encounter.

Other factors significantly related to economic growth are advances in new knowledge and increased education levels of the work force. Occupational growth is projected to expand most rapidly in the higher skilled technical occupations. Tomorrow's workers will likely need improved skills in the selection and communication of information. Many of today's skills considered to be of a "higher" level are the potential basic skills of tomorrow. Attention given only to the minimum competencies, as currently defined, shows a lack of foresight and leaves many students without adequate preparation for future learning and employability. The National Assessment of Educational Progress (NAEP) surveys the knowledge, skills, and attitudes of the nation's seventeen-year-old students. Survey results indicate that today's minimum skills are demonstrated successfully by a majority of students. Higher-order skills, however, are achieved only by a minority of seventeen-year-olds, and this proportion declined over the past decade. Many efforts are already underway to promote higher standards of educational achievement. Future actions must include long-range planning in the following areas:

- An increased awareness of the contribution of human resources to economic productivity.
- An understanding of the diverse needs of tomorrow's students and of workers displaced by technological changes.
- Improved education/industry partnerships to maintain relevant goals in education.
- Re-evaluation processes of essential employment skills.
- Improved curricula that incorporate future requirements and instruction in higher order skills. [pg. 1-2]

The above stated observations on national implications have equal relevance for the state of Utah. In fact, several of these observations are central in the Utah reform effort.

The long-term decline in ACT college entrance scores, which characterized both national and state performance during the late 1970's and early 1980's suggested the need for programs which stressed appropriate preparation for each student and renewed emphasis on intermediate and higher-level skills.

The answer would seem not to be unrealistically high standards imposed on all students regardless of their capabilities or educational intentions. What is called for is the intelligent tailoring of programs for students based on their needs. A more rigorous program, including higher standards, would seem to offer the greatest employment and postsecondary opportunities for all students. A strong emphasis on designing educational programs to meet the needs of individual students is the essence of the Utah State Board of Education's major strategic planning initiative, A Shift in Focus. Many of the results reviewed in this edition of Quality Indicators support the validity of this student-centered approach.

The advent of an information society carries with it the strong need for the preparation of a large segment of the work force skilled in mathematics, science, and technology. An Education Commission of the States report cites the work of the National Science Board's Commission on Pre-College Education in defining three major tasks that the educational system must address in these areas:

1. Generate a sufficiently large pool of well-prepared and motivated students to pursue professional careers in science and engineering;

2. Provide a range of high quality educational opportunities that are sufficiently broad and flexible to prepare a wide spectrum of students for careers in technically-oriented occupations and professions; and

3. Raise the general science and technology literacy level of all students to prepare them better to live in the society of today and tomorrow, regardless of what careers they elect to pursue (National Science Board, 1982). [ECS pg. 44]

Implementation of the Research on Effective Schools. A growing body of research information exists which provides the basis for improving elementary and secondary education and is based on school effectiveness research over the past several years. Michael Cohen of the National Institute of Education offers the following synopsis of this body of information:

> This large collection of research findings holds great promise for the improvement of the nation's schools. If state and local leaders are willing to examine the concepts, theories, and frameworks inherent in the research, then to apply them -- carefully tailored to fit state and local circumstances -- schools will surely be on the road to becoming more effective. The research does not promise "overnight cures"; it only offers some grounds for optimism. [pg. 6]

Utah has initiated a number of efforts which are congruent with the research on effective schools. The entire effort in implementing an objectives-based core curriculum and assessment system is very much in harmony with the findings of the effective schools research as are the state's thrusts in outcome-based education and use of technology to support instruction.

The State Office of Education (1984) has prepared an extensive report entitled "Research Resources Dealing With the Effective Schools Literature - Classroom Processes." This compendium presents an analysis of eleven classroom processes which have proven to be effective in enhancing academic achievement. It also identifies resources and techniques which would be useful to teachers in implementing such processes. The areas identified in the study are the following:

- Academic Expectations
- Academic Learning Time
- Classroom Management
- Curricular Congruence
- Direct Teaching/Instruction
- Monitoring of Student Progress and Evaluative Feedback
- Homework
- Parents Academic Involvement With Their Own Children
- Reinforcement of Self-Concept
- Rewards for Achievement
- Teacher Questioning Practices

Responsible implementation of the processes identified in this research and listed on the previous page holds great potential for improvement of the academic performance of Utah students.

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